UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

Caldera-Related Lava Flows and Intrusions of the South-Central San Juan Mountains, Colorado-Analytical Data

by

Douglas B. Yager¹, Peter W. Lipman², and David A. Sawyer³

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¹U.S. Geological Survey Box 25046, MS 903 Denver Federal Center Denver, CO 80225 ²U.S. Geological Survey MS 910 345 Middlefield Road Menlo Park, CA 94025 ³U.S. Geological Survey Box 25046, MS 913 Denver Federal Center Denver, CO 80225

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CALDERA-RELATED LAVA FLOWS AND INTRUSIONS OF THE SOUTH-CENTRAL SAN JUAN MOUNTAINS, COLORADO--ANALYTICAL DATA

ABSTRACT

Petrographic, major-oxide, and trace-element data for voluminous Oligocene lava flows and associated intrusions from the southern side of the central San Juan caldera cluster, Colorado, allow subdivision of these postcaldera rocks: (1) volcanic rocks of South River Peak (mostly andesite and mafic dacite containing <63% SiO₂), spatially related to the newly recognized 27.2 Ma South River caldera (source of the Wason Park Tuff), and (2) Fisher Quartz Latite (mostly silicic dacite: >63% SiO₂), related to the 26.9 Ma Creede caldera (source of the Snowshoe Mountain Tuff). The volcanic rocks of South River Peak, previously included with the Fisher Quartz Latite, are separated because of their more mafic compositions and association with a seperate caldera cycle. In the same region, slightly older andesite-dacite volcanics of Table Mountain (27.2-27.3 Ma) are chemically distinct from the younger lavas, and these volcanics may represent post-collapse volcanism associated with the newly identified Lake Humphreys caldera (source of the 27.3 Ma tuff of Blue Creek), or, alternatively, extracaldera volcanism prior to formation of the South River caldera. The caldera-related lava flows are classified by reference to a total alkali versus silica diagram, and sample locations are shown on an accompanying generalized geologic map (scale 1:50,000).

INTRODUCTION

Large volume ash-flow sheets and associated calderas near Creede in the central San Juan volcanic field, Colorado, were initially described by Steven and Ratté (1965) and have been much studied since. Nevertheless, stratigraphic and structural relations have been clarified only recently for several of the major ash-flow sheets, associated flows, and source calderas (table 1), based on field mapping, petrologic study, ^{40/39}Ar geochronology, and paleomagnetic data (Lipman and others, 1989; Lanphere, 1988; R. Reynolds and J. Rosenbaum, unpubl. data, 1989). For example, the source of the 27.2 Ma Wason Park Tuff, previously inferred to be concealed beneath the Creede caldera (Ratté and Steven, 1967), has been shown to be the newly recognized South River caldera (Lipman and others, 1989). Post-collapse lava flows related to the South River and Creede calderas in the southern part of the central San Juan cluster (fig. 1) are the focus of the chemical data and brief interpretation reported here.

TABLE 1. ASH-FLOW TUFFS AND LAVAS OF THE CENTRAL SAN JUAN CALDERA CLUSTER [Modified from Lipman and others, 1989;

40/39 Ar ages from Lanphere, 1988 and Lanphere, unpublished data]

Tuff Unit	Source caldera Age	e of Tuffs (Ma)	Post-collapse lavas
Nelson Mountain	San Luis caldera complex	26.1	Stewart Peak & Baldy Cinco
Rat Creek	San Luis caldera complex	26.5	
Snowshoe Mountain	Creede	26.9	Fisher Quartz Latite
Wason Park	South River	27.2	Volcanic rocks of South River
Blue Creek	Lake Humphreys	27.3	Volcanics of Table Mountain?
Carpenter Ridge	Bachelor	27.4	
Fish Canyon	La Garita	27.55	
Masonic Park	Mount Hope	28.3	Andesite of Sheep Mountain

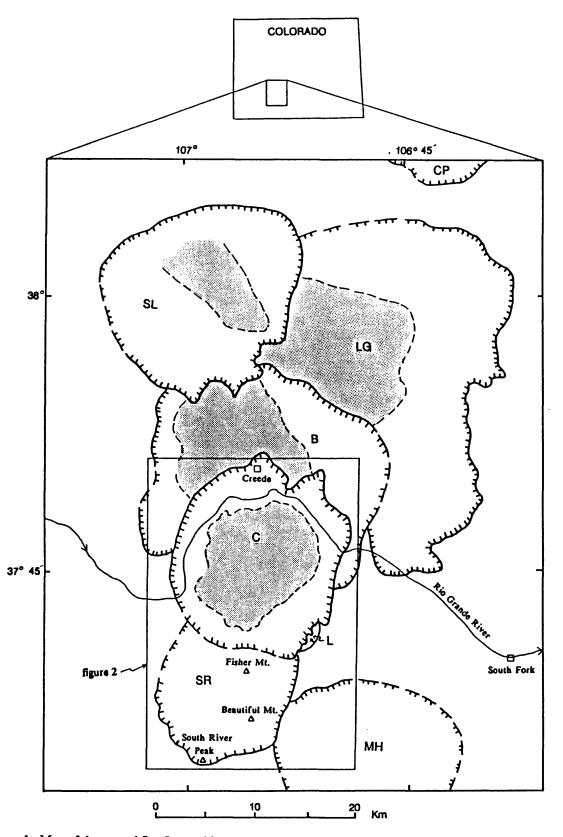


Figure 1. Map of the central San Juan caldera cluster showing location of geologic map included in (fig. 2) and selected geographic features. Caldera margins are shown by hachured lines, stipple pattern shows intra-caldera resurgent uplifts. Bar and ball symbol is on downdropped side of a ring fault related to Lake Humphreys caldera eruption. Key to calderas: B, Bachelor; C, Creede; CP, Cochetopa Park; LG, La Garita; L, Lake Humphreys; MH, Mount Hope; SL, San Luis; SR, South River. Modified after Lipman and others (1989 figure 3.2).

The 84 new major-oxide and trace-element chemical analyses (tables 2 and 3 respectively) are mainly for post-collapse andesitic (53-63% SiO₂) and dacitic (63-70% SiO₂) lava flows, mudflow deposits, and intrusions related to the South River and Creede calderas. Table 4 provides rock type and sample locality information, and table 5 contains mineralogic data. Geochemical sampling was done while mapping the geology at 1:24,000- scale during the summers of 1986-1989. Previously published mapping in this region is at 1:250,000- and 1:62,500- scales (Steven and Lipman, 1973; Steven and others, 1974). Previous petrologic studies on andesites of this region have been done by Askren and others (1988, 1989). A combined geologic and sample locality map at 1:50,000 scale (fig. 2) provides a context for the chemical data (tables 2 and 3). The chemical data are also compiled on a 5 1/4" floppy disc in spreadsheet format and are included with this report. This file may be accessed by any program which accepts spreadsheet files in the *.WK1 format. Petrographic descriptions and chemical data compilation are by Yager; geologic interpretation is by Lipman and Sawyer.

Much of the study area is relatively remote and rugged, and includes parts of the Rio Grande National Forest and the Weminuche Wilderness. Topographic relief ranges from 2,653 meters elevation near the town of Creede, Colorado, to 4,008 meters on the Continental Divide at South River Peak. Although established trails near Ivy, Fisher, and Goose Creeks (fig. 2) provided access to the remote areas near South River Peak, back-country camps were necessary to permit detailed geologic mapping and sampling.

GEOLOGIC SETTING

Igneous activity began in the San Juan volcanic field at about 35 Ma with eruption of intermediate-composition lava flows and breccias of the Conejos Formation. These eruptions continued until 30 Ma when large caldera-forming eruptions of ash flows began. Andesitic to rhyolitic lava flows erupted intermittently between the caldera-forming eruptions, from vents commonly localized by caldera structures (table 1; fig. 2). Bimodal volcanism (basalt and rhyolite) began at about 26 Ma and continued to 5 Ma, coincident with opening of the Rio Grande rift (Lipman and others, 1970).

Eight major caldera-forming eruptions in the central San Juans (table 1) occurred 28.3 Ma - 26.1 Ma (Steven and Ratté, 1965; Steven and Lipman, 1976; Lanphere, 1988; Lipman and others, 1989). Voluminous post-collapse lavas along the south side of the central caldera cluster were previously mapped entirely as Fisher Quartz Latite and interpreted as Creede caldera-fill (Steven and Lipman, 1973, 1976; Steven and others, 1974). These rocks are now interpreted to be separable and related to formation of at least two calderas in the southern part of the cluster: the volcanic rocks of South River Peak are spatially related to the recently recognized South River caldera that erupted the Wason Park Tuff at 27.2 Ma, and the Fisher Quartz Latite, related to the Creede caldera that erupted Snowshoe Mountain Tuff at 26.9 Ma, Lipman and others (1989).

The newly identified Lake Humphreys caldera, is the source of the tuff of Blue Creek, a discrete ash-flow sheet only recently recognized as separate from the dacitic upper part (Mammoth Mountain member) of the Carpenter Ridge Tuff (Lipman and Sawyer, 1988). Evidence for existence of the Lake Humphreys caldera includes the intracaldera character of the tuff of Blue Creek in the Lake Humphreys area, and preservation of an arcuate ring fault that drops the thick intracaldera tuff of Blue Creek down against early intermediate-composition lavas and breccias of the Conejos Formation. The tuff of Blue Creek near Lake Humphreys has several characteristics of an intracaldera assemblage: exceptional thickness (several hundred meters, with no base exposed), dense welding, and propylitic alteration. Younger dacitic lava flows (Fisher Quartz Latite) unconformably overlie both the intracaldera tuff of Blue Creek, rocks of the Conejos Formation, and the ring fault near Lake Humphreys. The earliest lava flows in the study area, the volcanics of Table Mountain, may represent postcaldera volcanism related to the Lake Humphreys caldera, or alternatively incipient volcanism related to development of the South River caldera.

CALDERA-RELATED LAVA FLOWS

Volcanics of Table Mountain

The volcanics of Table Mountain (Ttm) overlie the tuff of Blue Creek, previously included in the Mammoth Mountain member of the Carpenter Ridge Tuff, and also predate the Wason Park Tuff (fig. 3) (Steven and Lipman, 1973). The volcanics of Table Mountain include lava flows, mudflow deposits, and small intrusions of fine-grained andesite and porphyritic dacite (59-68% SiO₂). Dominant phenocrysts are plagioclase and hornblende; some flows also contain pyroxene or biotite.

The volcanics of Table Mountain are chemically distinct from post-collapse lavas related to both the South River and Creede calderas. The Table Mountain lavas have lower potassium concentrations relative to total iron

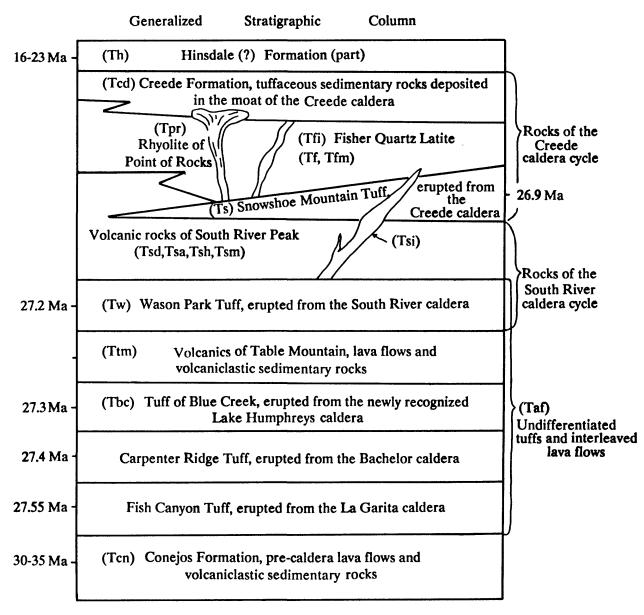
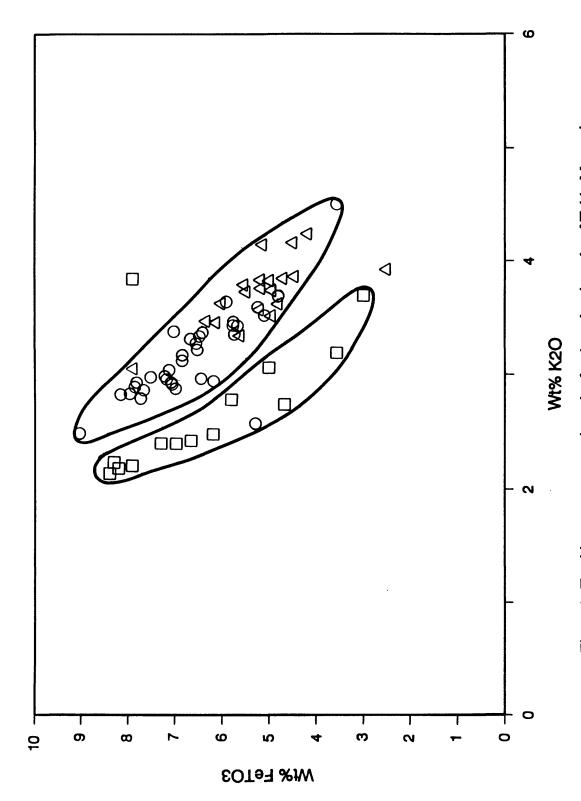


Figure 3. Generalized stratigraphic column of rocks in the south-central San Juan Mountains. Modified from Lanphere, 1988; Lipman and Sawyer, 1988; Lipman and others, 1989; and Marvin Lanphere unpublished data, 1990. Refer to figure 2 for more detailed descriptions of all units except Taf volcanics. Description of Taf may be found in Steven and others (1974), and Lipman and others (1989). Letter symbols in parentheses correspond to those used on geologic map (figure 2).



squares) and the post-collapse lava flows of the South River (circles) and Creede triangles) calderas. Field boundaries are shown as solid lines around the volcanics of Table Mountain, and the combined South River and Creede post-collapse lava flows.

The volcanic rocks of South River Peak and volcanics of Table Mountain samples that plot outside field boundaries are possibly due to alteration. Chemical distinctions between the Table Mountain and younger post-collapse lavas are also seen in variation diagrams of rubidium versus strontium as well as potassium versus silica and titanium versus silica.

The volcanics of Table Mountain are tentatively interpreted as representing post-caldera volcanism related to the Lake Humphreys caldera, based on their stratigraphic position above the tuff of Blue Creek east of Table Mountain, and their areal distribution proximal to the Lake Humphreys caldera. Alternatively, the volcanics of Table Mountain could constitute incipient volcanism related to development of the South River caldera. A third possibility is that the volcanics of Table Mountain record extracaldera volcanism, unrelated to any caldera. In addition to the volcanics of Table Mountain, unnamed lava flows between the tuff of Blue Creek and the Wason Park Tuff exposed in lower Goose Creek and Wagon Wheel Gap may also be part of post-collapse volcanism related to the Lake Humphreys caldera.

Volcanic rocks of South River Peak

The South River caldera, associated with eruption of the Wason Park Tuff, is largely filled by andesitic to mafic dacitic lava and mudflow deposits, here designated the volcanic rocks of South River Peak. The base of the intracaldera lavas is not exposed, but they are at least 900 meters thick. Additional evidence for the South River caldera includes the dense welding of outflow Wason Park Tuff beyond the South River caldera, and contact relations at the South River caldera topographic wall. Lava flows within the caldera, belonging to the volcanic rocks of South River Peak, lap against the older Carpenter Ridge Tuff, tuff of Blue Creek, and Wason Park Tuff along a steep unconformity that defines the topographic wall of the South River caldera for almost 180° of arc, from upper Red Mountain Creek eastward, along the Continental Divide, and into upper Goose Creek (fig. 2).

The volcanic rocks of South River Peak contain three dominant lithologies: 1) andesite, 2) hornblende andesite, and 3) mafic dacite (fig. 3). All lithologies are finely porphyritic and contain plagioclase averaging 2.5 mm in length.

The andesite unit consists of dark-gray, fine-grained lava flows, exposed mainly low in the stratigraphic sequence of the volcanic rocks of South River Peak along the southern margin of the South River caldera. These flows range from 56-61% in SiO₂ content and contain phenocrysts of plagioclase, clinopyroxene, +/- orthopyroxene, +/- sparse hornblende, and iron-titanium oxides.

Hornblende andesite is more silicic (59-62% SiO₂), mostly lighter in color, and more coarsely porphyritic than andesite. It contains more abundant and larger hornblende phenocrysts; hornblende predominates over pyroxene as the dominant mafic mineral, and some flows also contain sparse biotite.

The mafic dacite flows crop out on Beautiful Mountain (fig. 1) and in Fisher Creek. They mostly occur high in the stratigraphic sequence of the volcanic rocks of South River Peak and are compositionally transitional into the overlying dacite of the Fisher Quartz Latite. Mafic dacite mostly ranges from 62-63% SiO₂, although a few andesite, as well as more silicic dacite, lava flows are interbedded in this unit. The phenocryst mineralogy of the mafic dacites is similar to the hornblende andesites, except that biotite is common.

In contrast with other calderas of the central San Juan cluster, there was no post-collapse resurgence of the South River caldera. Except for the andesite (56-62% SiO₂) and mafic dacite (62-63% SiO₂) along the southern margin, the South River caldera probably remained incompletely filled until after the Creede caldera formed. After eruption of the Snowshoe Mountain Tuff, post-collapse dacite lavas of the Fisher Quartz Latite (Tf; mostly 63-68% SiO₂), filled the northern parts of the South River caldera.

Although lava flows of the volcanic rocks of South River Peak were erupted from vents along the south margin of the South River caldera and are dominantly more mafic than younger lava flows of the Fisher Quartz Latite, stratigraphic and petrologic relations among these two lava types are locally complex. Lava flows of the volcanic rocks of South River Peak mostly dip toward the northeast from South River Peak, inward toward the center of the caldera, and mostly underlie the more silicic lava flows of the Fisher Quartz Latite and breccias related to the Creede caldera. Nevertheless, silicic dacite is locally present low in the sequence of the volcanic rocks of South River Peak, and fine-grained andesite continued to be erupted within the South River caldera area (near South River Peak) after formation of the Creede caldera. Silicic dacite lavas similar to the Fisher Quartz Latite are locally present low in the Fisher and Ivy Creek drainages (fig. 2), and clasts of silicic dacite (>63% SiO₂) in mudflow deposits low in the South River Peak assemblage also document eruption of relatively evolved Fisher Quartz Latite-type magma early during the South River caldera cycle. Conversely, outflow facies Snowshoe Mountain Tuff near the south margin of the South River caldera (along the Continental Divide) is cut by an andesite dike and overlain

by several andesite lavas and interbedded mudflow deposits, providing evidence for the continued presence of andesite magma beneath the South River caldera during the Creede caldera cycle.

Volcanic rocks on Beautiful Mountain (fig. 2) are chemically and petrographically transitional between the volcanic rocks of South River Peak and Fisher Quartz Latite. In general, Beautiful Mountain rocks show intermediate concentrations of rubidium with respect to strontium and are transitional to concentrations seen in Fisher Quartz Latite (fig. 5). Also, strontium concentrations of Beautiful Mountain rocks have a similar range to those in Fisher Quartz Latite (fig. 5). These rocks are included in the volcanic rocks of South River Peak because (1) texturally they are similar, and (2) in the Beautiful Mountain area they underlie more coarsely porphyritic lavas typical of Fisher Quartz Latite.

Intrusions of andesite and fine-grained diorite (Tsi) occur west and southwest of South River Peak and near Goose Creek. The intrusive rocks include fine-grained, dark-gray dikes and larger irregular bodies of variable texture that are interpreted as near-roof-level exposures of an arcuate ring intrusion along the south margin of the South River caldera. These intrusions may be related to the South River caldera cycle, as indicated by local cross-cutting relations with the Wason Park Tuff, by their distribution along the southwestern to southeastern margins of the South River caldera, and by associated hydrothermal alteration that extends into the volcanic rocks of South River Peak. The intrusive rocks are likely to be feeders for the volcanic rocks of South River Peak, because of their similar mineralogy and chemistry. Larger intrusions near South River Peak and Goose Creek, and adjacent wall rocks, are variably propylitically altered, silicified, and pyritized.

Fisher Quartz Latite

The topographic margins of the South River and younger Creede calderas overlap near Fisher Mountain (fig.2), where they are buried by a 0.6-km-thick section of silicic dacite, previously mapped and named as Fisher Quartz Latite. These lavas are inferred to have erupted along the ring fractures of the South River and Creede calderas. Fisher Quartz Latite magmatism commenced after eruption of the Snowshoe Mountain Tuff; a few Fisher Quartz Latite lava flows are domed by Creede caldera resurgence, and lava eruptions continued during deposition of volcaniclastic lake sediments (Creede Formation, in the topographic moat of the Creede caldera). Some Fisher Quartz Latite lava flows are as much as several hundred meters thick, where they ponded in the Creede caldera moat or against the topographic wall of the caldera. The Creede caldera is strongly domed, and eruption of the Fisher Quartz Latite may have been associated with magmatic resurgence of the caldera.

The Fisher Quartz Latite is generally more silicic and more coarsely porphyritic than the volcanic rocks of South River Peak. Although dacites are volumetrically dominant, analyses of Fisher Quartz Latite lava flows vary from 59-73% SiO₂, averaging ~64.4% and including two andesite samples and one rhyolite sample. Phenocrysts include plagioclase (averaging 3.5 mm long), hornblende, biotite, iron-titanium oxides, +/- pyroxene, +/- sanidine (locally up to 4 cm and resorbed), +/- trace sphene, and +/- trace quartz.

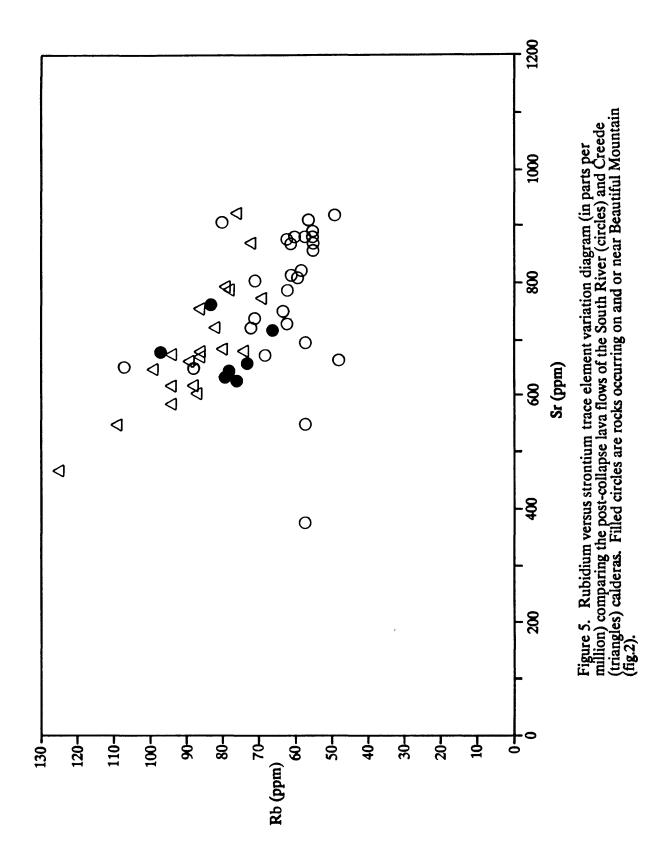
Subtle chemical differences exist, especially in trace elements, between the volcanic rocks of South River Peak and the Fisher Quartz Latite, in addition to the more silicic average compositions of the latter. Fisher Quartz Latite generally has higher rubidium versus strontium than do the volcanic rocks of South River Peak (fig. 5), although, there is overlap for the transitional Beautiful Mountain lava flows. One mudflow clast in the volcanic rocks of South River Peak has a similar rubidium concentration to that seen in the Fisher Quartz Latite.

Volcanics of Point of Rocks

The volcanics of Point of Rocks consist of light-gray, flow-laminated, high-silica rhyolite (75% SiO₂) that occur as erosional remnants of a small lava dome complex on the northwestern margin of the Creede caldera resurgent dome (Steven and Ratté, 1973). Phenocrysts include sanidine, plagioclase, biotite, and traces of quartz. Rare-earth-element data show this unit to be transitional to the bimodal basalt - rhyolite episode of volcanism (Hinsdale Formation) in the San Juan volcanic field (Lipman, 1987).

HINSDALE FORMATION (?)

Lava flows of xenocrystic basalt to dacite are probably correlative with the regionally distributed Hinsdale Formation, and are the youngest volcanic unit in the study area, overlying lava flows of the Fisher Quartz Latite along the ridge northeast of Beautiful Mountain (fig. 2). These lava flows contain small sparse phenocrysts of plagioclase, augite, and oxidized hornblende; xenocrysts of resorbed quartz are distinctive. None of the older caldera-related lava flows contain resorbed quartz.



CHEMICAL CLASSIFICATION OF THE VOLCANIC ROCKS OF SOUTH RIVER PEAK AND FISHER QUARTZ LATITE

Based on the IUGS total alkali-silica classification of Le Bas and others, (1986), most volcanic rocks of South River Peak plot in the trachyandesite field, whereas most Fisher Quartz Latite samples plot as trachydacites (fig. 6). The most mafic Fisher Quartz Latite lava flows contain resorbed sanidine. Some volcanic rocks of South River Peak are compositionally transitional into the Fisher Quartz Latite lava flows, especially the samples from Beautiful Mountain, as noted previously. Although all these lava flows have alkaline affinities, they lack alkaline phenocryst minerals such as sodic pyroxenes or amphiboles. Alternatively, based on the alkaline/sub-alkaline classification of Irvine and Baragar (1971), all of the South River Peak and Fisher Quartz Latite lava flows are subalkaline (fig. 6).

ANALYTICAL METHODS

Wavelength dispersive X-ray fluorescence analyses (major oxides) were made at the U.S. Geological Survey, Branch of Geochemistry in Denver. Energy dispersive X-ray fluorescence (EDXRF) trace-element analyses were made using the methods of Elsass and DuBray (1982) and of Quick and Haleby (1988). The two EDXRF methods are comparable (J. Quick and D. Yager, unpublished data, 1988), and analytical precision of the Elsass and duBray EDXRF technique is discussed in Sawyer and Sargent (1989).

Figure 6. Total alkali versus silica plot showing distinctions between volcanic rocks of South River Peak (circles) and Fisher Quartz Latite (triangles). Rock classification fields shown are after Le Bas and others (1986). The alkaline-subalkaline distinction of Irvine and others (1971) is also shown. The solid triangle is the most mafic Fisher Quartz Latite sample, and contains resorbed sanidine.

Wf% Si02

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REFERENCES CITED

- Askren, D.R., Roden, M.F., and Whitney, J.A., 1988, Origin and implications of small-volume andesites interlayered with large-volume ash-flow tuffs of the San Juan volcanic field, south central Colorado (abs.): Geological Society of America Centennial Celebration Abstracts with Programs, v. 20, no.7, p. A369.
- ______1989, Small volume andesites interlayered with large volume ash-flow tuffs in the San Juan (CO), Indian Peak (UT-NV), and Central Nevada volcanic complexes (abs.): International Association of Volcanology and Chemistry of the Earth's Interior, Continental Magmatism Abstracts, New Mexico Bureau of Mines Bulletin 131, p. 9.
- Elsass, F.E., and du Bray, E.A., 1982, Energy-dispersive X-ray fluorescence spectrometry using the KEVEX 7000 system: Saudi Arabian Deputy Ministry for Mineral Resources Open-File Report USGS-OF-02-52, 53 p.
- Irvine, T.N. and Baragar, R.A., 1971, A Guide to the Chemical Classification of Igneous Rocks: Canadian Journal of Earth Sciences, v. 8, p.523-548.
- Lanphere, M.A., 1988, High resolution ⁴⁰Ar/³⁹Ar chronology of Oligocene volcanic rocks, San Juan Mountains, Colorado: Geochemica et Cosmica Acta, v. 52, p. 1425-1434.
- Le Bas, M.J., Le Maitre, R.W., Streckeisen, A., and Zanettin, B., 1986, A Chemical Classification of Volcanic Rocks Based on The Total Alkali-Silica Diagram: Journal of Petrology, v. 27, p. 745-750.
- Lipman, P.W., 1987, Rare-earth-element compositions of Cenozoic volcanic rocks in the southern Rocky Mountains and adjacent areas: U.S. Geological Survey Bulletin 1668, 23 p.
- Lipman, P.W., Steven, T.A., and Mehnert, H.H., 1970, Volcanic areas: history of the San Juan Mountains, Colorado, as indicated by potassium-argon dating: Geological Society of America Bulletin, v. 81, p. 2329-2352
- Lipman, P.W., and Sawyer, D.A., 1988, Preliminary geology of the San Luis Peak Quadrangle and adjacent areas, San Juan Volcanic Field, Southwestern Colorado: U.S. Geological Survey Open-File Report 88-359, 32 p.
- Lipman, P.W., Sawyer, D.A., and Hon, K., 1989, Excursion 16B: Oligocene-Miocene San Juan volcanic field, Colorado, in Chapin, C.E., and Zidek, J., eds., Field excursions to volcanic terranes in the western United States, Volume I: Southern Rocky Mountain region: New Mexico Bureau of Mines and Mineral Resources Memoir 46, p. 330-350.
- Quick, J.E., and Haleby, A.M., 1988, XAP, a program for deconvolution and analysis of complex x-ray spectra: Saudi Arabian Ministry of Petroleum and Mineral Resources, Technical Record, USGS-TR-O8-3, 33 p.
- Ratté, J.C., and Steven, T.A., 1967, Ash flows and related volcanic rocks associated with the Creede caldera, San Juan Mountains, Colorado: U.S. Geological Survey Professional Paper 524-H, p. H1-H57.
- Sawyer, D.A., and Sargent K.A., 1989, Petrologic evolution of divergent peralkaline magmas from the Silent Canyon caldera complex, southwestern Nevada volcanic field: Journal of Geophysical Research, v. 94, no. B5, p. 6021-6040.
- Steven, T.A., and Ratté, J.C., 1965, Geology and structural control of ore deposition in the Creede district, San Juan Mountains, Colorado: U.S. Geological Survey Professional Paper 475-D, p. D54-D63.
- Steven, T.A., and Lipman, P.W., 1973: Geologic map of the Spar City Quadrangle, Mineral County, CO, U.S. Geological Survey Map, GQ-1052. Scale 1:62,500
- Steven, T.A., and Ratté, J.C., 1973, Geologic map of the Creede Quadrangle, Mineral and Saguache Counties, CO, U.S. Geological Survey, GQ-1053.
- Steven, T.A., and Lipman, P.W., 1976, Calderas of the San Juan volcanic field, southwestern Colorado: U.S. Geological Survey Professional Paper 958, 35 p.
- Steven, T.A., Lipman, P.W., Hail, W.J., Jr., Barker, F., and Luedke, R.G., 1974, Geologic Map of the Durango Quadrangle, Southwestern Colorado: U.S. Geological Survey Miscellaneous Investigation Series Map, I-764. Scale 1:250,000

Table 2. Major-oxide data (calculated volatile free) for volcanic rocks discussed in this report. Sample numbers correspond to localities in figure 2. Major-oxide analysis were done at the U.S. Geological Survey in Denver by analysts J. Taggart, A. Bartel, and D. Siems.

	Formation												oxide sum
Aap S	Map Symbol	%SIO 2	%AL203	FET03	%MGO	%CAO	%NA20	%K20	%TI02	%P205	8MNO	2	<u>ō</u> +
F	Th?	58.8	15.36	8.44	2.66	6.25	3.68	2.49	1.23	0.45	0.11	1.06	99.50
-	h?	57.9	15.39	8.65	3.60	6.11	3.66	2.43	1.25	0.46	0.12	0.56	99.60
-	'n?	61.4	14.71	7.24	2.51	5.56	3.60	3.21	1.03	0.41	0.11	0.77	99.76
_	Jh?	60.4	14.45	7.35	3.05	5.85	3.55	3.15	1.05	0.42	0.10	1.06	99.43
-	'n?	63.6	14.11	6.27	2.30	4.92	3.62	3.35	0.89	0.34	0.0	0.77	99.47
_	ğ	75.12	13.78	0.92	0.17	0.46	3.03	5.62	0.19	0.00	0.00	1.06	99.30
	¥	65.4	15.41	5.01	1.66	4.07	3.46	3.85	99.0	0.27	0.07	1.93	99.84
	=	73.1	13.84	2.52	0. 84	2.19	3.26	3.93	0.47	0.0	0.0	1.23	100.25
	¥	61.2	15.86	6.35	2.32	4.72	4.10	3.48	0.94	0.47	0.05	1.01	99.52
	¥	63.2	15.72	5.50	2.31	4.50	3.16	3.75	99.0	0.31	0.08	2.63	99.16
	=	66.2	15.20	4.98	1.31	3.67	3.62	3.54	0.54	0.23	0.05	0.67	99.41
	¥	63.6	15.71	5.52	2.08	4.00	3.62	3.81	99.0	0.31	90.0	0.72	99.36
	¥	64.7	15.57	4.73	1.76	3.77	3.84	3.86	0.61	0.28	0.08	1.69	99.20
	¥	64.5	15.60	5.18	1.84	3.96	3.72	3.78	0.67	0.30	0.0	1.29	89.68
	=	65.3	15.68	5.19	1.17	3.57	3.98	3.85	0.64	0.29	0.08	0.52	99.79
	¥	63.4	16.47	4.82	1.59	4.25	3.86	3.64	0.63	0.34	0.10	1.61	99.12
	<u></u>	59.5	16.44	7.90	2.11	5.54	3.66	3.07	0.97	0.39	0.12	0.86	99.41
	<u></u>	62.6	16.26	6.01	1.33	4.18	3.96	3.64	0.83	0.37	0.11	0.98	99.31
	<u></u>	65.7	15.32	4.51	1.73	3.55	3.67	4.18	0.61	0.29	0.08	2.06	99.29
	¥	63.8	16.07	4.95	1.75	4.32	3.72	3.76	99.0	0.35	0.10	1.68	99.47
	<u></u>	65.5	15.71	4.48	1.69	3.58	3.89	3.88	0.57	0.27	0.08	1.97	99.64
	≒	66.3	16.41	4.20	1.14	2.85	3.34	4.25	0.63	0.12	0.03	1.25	99.31
-	ſfm	64.7	15.60	5.15	1.88	4.16	3.29	4.15	0.63	0.33	0.0	1.95	99.92
	¥	63.5	16.71	5.22	1.08	4.46	4.12	3.58	0.68	0.36	0.10	0.64	99.82
	¥	62.1	16.68	6.14	1.13	4.56	4.08	3.48	0.78	0.41	0.0	1.10	99.42
	Ŧ	63.3	16.16	5.61	2.10	4.54	3.65	3.36	0.67	0.3 4	0.07	2.21	99.81
	Lsd	65.0	16.19	4.81	1.72	4.64	3.01	3.72	0.48	0.23	0.09	2.40	99.85
	Lsd	62.7	15.93	5.90	1.96	4.31	3.79	3.65	0.73	0.34	0.18	0.80	99.49
_	ps	62.4	15.57	6.48	2.35	4.90	3.59	3.35	0.77	0.34	0.11	0.42	99.82
•	Lsd	62.8	15.90	5.77	2.03	4.57	3.74	3.45	0.70	0.37	0.11	1.24	99.42
	Tsd	64.9	15.63	5.23	1.26	4.04	3.78	3.60	0.63	0.32	0.12	0.80	99.53
	Tsa	59.9	16.42	7.08	2.07	5.45	3.96	2.95	0.87	0.47	0.0	0.70	99.28

Table 2 continued.

oxide sum	io +	99.64	99.30	99.97	99.23	99.84	99.81	99.52	99.56	99.55	99.81	99.53	99.75	99.85	99.62	69.66	99.92	99.66	99.82	99.37	99.64	99.39	99.53	99.63	99.48	99.56	99.90	69.66	99.67	99.07	99.36	99.31	99.41
•	2	0.72	1.27	3.26	1.70	1.99	3.81	1.47	1.55	1.34	1.35	0.72	1.41	1.10	2.59	1.29	1.54	3.82	5.18	1.92	0.88	2.06	0.76	1.29	0.89	1.95	1.58	2.27	0.34	2.74	2.35	2.50	1.54
	SMNO %	0.12	0.11	0.0	0.08	0.0	0.17	0.17	0.15	0.13	0.13	0.12	0.05	0.11	0.12	0.13	0.16	0.08	0.12	0.0 40.0	0.16	0.10	0.10	0.12	0.12	0.10	0.11	0.15	0.16	0.13	0.16	0.31	0.10
	%P205	0.48	0.31	0.30	0.24	0.27	0.40	0.55	0.52	0.47	0.76	0.51	0.42	0.38	0.34	0.44	0.34	0.29	0.33	0.23	0.50	0.45	0.49	0.43	0.48	0.36	0.40	0.26	0.48	0.25	0.22	0.25	0.51
	%TI02	96.0	0.79	0.69	0.59	0.77	0.74	0.84	0.82	0.83	1.32	1.14	0.77	99.0	0.60	0.97	0.87	0.72	0.77	0.75	0.93	0.79	0.93	0.80	0.97	0.72	0.59	0.70	0.91	0.50	0.49	0.49	1.0
	%K20	2.91	2.89	3.37	3.53	3.23	3.05	2.63	2.35	2.70	2.09	2.49	3.39	2.97	2.58	2.83	3.05	2.95	3.12	4.51	2.79	3.38	2.98	3.18	2.87	3.48	3.44	3.27	2.31	2.44	2.65	2.69	2.84
	%NA20	3.75	3.53	3.65	3.41	3.37	3.32	3.94	4.11	3.87	3.45	3.51	3.45	3.58	3.40	3.53	3.49	3.17	2.89	3.64	3.77	3.32	3.81	3.65	3.74	3.97	3.29	3.25	3.46	3.70	3.44	3.43	3.53
	%CAO	5.78	5.53	8.01	4.14	4.68	5.45	6.59	5.80	5.68	8.37	6.59	4.93	5.49	5.23	5.91	4.82	4.73	4.04	4.22	5.89	5.11	5.53	5.17	5.80	4.46	5.49	4.34	6.52	5.48	4.07	5.24	5.68
	%MGO	2.14	2.89	1.62	1.96	2.24	1.95	2.40	2.36	2.42	2.32	3.32	0.71	1.86	1.38	2.98	2.37	2.40	2.59	1.12	2.79	2.34	2.10	2.35	2.67	2.29	1.76	1.84	2.53	1.56	1.76	1.88	2.44
	FET03	7.86	6.98	5.74	5.10	6.52	6.38	7.30	7.71	7.63	9.70	9.03	7.02	6.43	5.29	8.15	7.12	6.18	98.9	3.58	7.73	6.40	7.51	6.84	7.85	5.74	2.67	6.57	8.24	5.30	5.04	5.22	7.94
	%AL203	16.32	15.70	15.40	15.36	16.02	16.95	17.56	17.37	16.83	17.84	16.42	18.46	17.19	17.45	16.01	15.95	16.01	15.93	16.72	16.34	16.24	16.43	16.31	16.25	15.71	17.48	16.58	17.26	16.66	16.08	16.62	16.56
	%SI02 9	59.3	9.09	61.1	64.8	62.6	61.4	57.6	58.3	59.0	53.8	56.4	9.09	61.2	63.2	58.8	61.8	63.1	63.2	64.5	58.7	61.3	59.7	8.09	58.7	62.7	61.7	62.7	57.8	63.0	65.4	63.2	58.8
Formation	Map Symbol	Tsh	Tsh	Tsh	Tsd	Tsd	Tsi	Tsi	ŢS.	Tsi	Tsi	Tsa	Tsa	Tsh	Tsd	Tsh	Tsh	Tsd	Tsd	Tsd	Tsh	Tsh	Tsh	Tsh	Tsh	Tsd	Tsm	Tsm	Τsi	Tsi	Tsi	Tsi	Tsh
	Field No.	DS89019	DS89029	DS89030	DS89034	DS89035	88L-32	88L-34	887-36	88L-61	89L-129	88L-31A	88L-31B	88L-31C	881-58	88L-62A	88L-62B	88L-62C	88L-62D	88L-62E	88 L- 65	88 7 -66	88L-70	89L-115	89L-122	89L-123	89L-128	89L-130	89L-135A	89L-135B	89L-143	89L-144	DY89-16

Table 2 continued.

oxide sum	<u>-Fo</u>	99.74	99.51	99.52	89.66	99.23	89.66	99.51	99.34	99.36	99.31	99.27	99.89	99.55	99.77	99.84	99.74	99.78	99.92	98.86	99.76
	<u></u>	0.77	<u>.</u> 8	2.15	1.30	0.29	0.52	1.18	2.57	1.53	2.59	99.0	3.52	0.82	0.77	1.12	0.89	1.97	1.20	0.90	1.12
	%WNO	0.10	0.12	0.13	0.11	0.14	0.10	0.12	0.09	0.08	0.11	0.05	0.13	0.15	0.16	0.12	0.12	0.08	0.15	0.12	0.07
	%P205	0.49	0.50	0.46	0.44	0.48	0.46	0.33	0.24	0.25	0.14	0.18	0.36	0.49	0.49	0.48	0.33	0.40	0.33	0.32	0.33
	%TI02	0.90	0.97	0.85	0.79	0.94	0.85	0.72	0.48	0.54	0.32	0.38	0.95	0.90	0.88	0.68	0.67	0.78	0.64	0.77	0.64
	%K20	2.99	2.94	2.97	3.32	2.87	2.93	2.40	3.07	2.74	3.71	3.20	3.85	2.14	2.24	2.48	2.40	2.20	2.43	2.18	2.78
	%NA20	3.93	3.62	3.70	3.54	3.69	3.98	3.27	3.40	3.56	3.67	3.75	2.93	3.72	3.67	3.84	3.61	3.63	3.49	3.52	3.65
	%CAO	5.52	5.83	5.15	5.09	5.74	5.63	6.21	4.58	4.97	3.36	3.84	5.18	6.74	6.53	5.97	5.93	2.90	6.05	6.35	5.21
	%MGO	2.21	2.74	2.25	2.25	2.69	2.36	2.25	1.69	1.49	0.61	1.05	3.02	2.41	2.53	1.20	1.70	1.56	2.13	2.33	1.49
	FET03	7.21	7.81	7.18	6.67	7.66	7.07	7.30	5.00	4.67	3.00	3.56	7.90	8.39	8.29	6.19	6.98	7.91	99.9	8.18	5.80
	%AL203	16.33	16.27	16.46	16.21	16.25	16.49	17.00	16.01	16.45	16.53	15.81	16.07	17.34	17.43	18.51	17.25	17.24	17.21	17.26	17.09
	%SI02 9	60.1	58.7	60.4	61.3	58.8	59.8	59.9	64.8	64.6	6.79	67.4	59.5	57.3	57.5	60.4	60.7	60.1	8.09	58.8	62.7
Formation	Map Symbol						Tsa														
	Field No.	DY89-17	DY89-18	DS89007	DS89008	DS89009	DS89010	89L-136	89L-137	89L-138	89L-140	89L-141	89L-147B	DY89-20	DY89-21	DY89-22	DY89-24	DY89-24B	DY89-25	DY89-26	DY89-27

Table 3. Trace element analyses (in parts per million) for volcanic rocks discussed in this report. Analyses were done at the U.S. Geological Survey by D. Yager. N.A. means data is not available. Sample numbers correspond to localities in figure 2.

PX	mdd	45	26	58	52	34	Ä.Ä	Ä.	Z.A.	48	39	29	45	42	38	38	45	44	4	4	41	37	42	4	4	46	40	33	61	38	44	44	61
ပိ	mdd	94	92	101	109	87	Z.A.	Z.A.	N.A.	92	72	88	82	11	83	82	86	83	92	79	73	79	68	88	78	98	73	62	98	73	88	87	86
٣	mdd	46	52	59	61	40	Ä.	Z.A.	Ä.Ä	51	44	67	47	44	47	20	54	39	47	49	45	43	33	47	42	55	44	33	84	42	41	20	47
Ва	mdd	801	864	896	851	791	Ä.	Z.A.	Z.A.	1280	929	1043	1004	1157	1162	1180	1237	1098	1300	1122	1049	1169	951	1032	1230	1365	984	924	1226	942	1068	1041	1221
Ş	mdd	10	12	-	4	13	21	21	22	2	14	13	14	1	16	4	14	14	18	15	13	4	15	14	4	17	10	10	17	4	19	15	15
72	mdd	160	154	146	149	142	174	174	145	211	184	184	185	160	179	176	195	179	196	177	174	166	184	187	188	194	186	164	196	181	206	194	208
>	mdd	23	24	24	24	22	18	20	20	20	22	30	27	21	22	23	24	53	24	24	24	17	20	23	24	25	22	25	48	29	27	24	28
ত	mdd	1119	1149	964	991	849	68	587	470	923	663	607	650	629	687	672	756	776	794	621	724	675	550	621	791	872	681	730	678	644	762	650	912
8	mdd	49	42	73	72	75	161	94	125	9/	83	87	66	86	80	86	86	69	79	88	82	94	109	94	78	72	74	62	97	78	83	88	26
Zu	mdd	29	119	106	114	113	Ą. Z	Z.A.	Z.A.	92	66	61	106	80	107	103	91	121	123	83	79	65	86	11	100	91	83	118	80	108	103	93	118
	%FeO	7.20	7.50	6.10	7.16	5.86	0.70	4.40	3.70	6.14	4.81	4.60	5.18	4.26	4.67	4.79	4.44	7.97	5.78	3.94	4.48	3.92	4.09	4.71	4.93	5.97	5.03	4.40	5.46	6.14	5.27	4.79	6.75
Formation	~																																Tsa
	Field No.	88L-67	88F68	88 L- 69	89L-100	89L-118	TPR-3	85L-39	SJ85-47	89L-101	89L-102	89L-107	89L-112	89L-120	DY89-6	DY89-10	DY89-11A	DY89-11B	DY89-12	DY89-14	DS89001	DS89003	DS89004	DS89006	DS89012	DS89014	DS89015	DS89028	DY89-7	DY89-8	DY89-9	DS89016	DS89017

Ž	mdd	5	39	37	33	43	45	72	52	48	49	44	47	4	43	43	44	42	4	49	20	47	48	49	44	5	43	5	41	29	38	33	20
ပိ	mdd	8	69	73	73	2	80	86	92	80	75	80	73	80	78	88	1	75	7	82	88	82	87	82	88	94	83	101	1	63	61	64	86
۳	mdd	47	37	43	4	9	33	29	37	5	43	33	43	4	47	42	40	37	42	51	20	53	45	49	49	22	46	28	44	32	36	36	48
Ва	mdd	1240	886	928	1021	951	1008	1178	959	1058	930	905	835	829	964	1176	949	974	985	1417	1209	1561	1242	1288	1206	1292	1105	830	844	865	885	964	1163
	mdd																																
77	mdd	201	171	176	181	185	5 8	206	179	175	153	199	190	187	205	185	186	172	181	180	200	191	216	199	193	1 8	198	187	210	152	136	166	192
>	mdd	53	52	53	5 2	27	83	32	30	2	38	24	58	24	18	5 8	24	9	8	0	52	20	59	83	58	8	33	38	33	22	22	5 6	8
ര്	mdd	877	716	627	634	657	603	1065	843	830	1001	857	749	969	664	808	674	550	376	721	920	788	880	813	968	907	738	652	774	742	645	673	870
8	ppm	62	99	9/	79	73	2	2	43	29	35	22	ည	22	48	29	68	22	22	72	49	62	9	9	22	8	7	107	47	49	47	41	22
75	mdd	122	115	111	72	109	83	139	116	65	158	112	9	99	97	86	67	99	6	9	121	83	88	83	92	105	117	128	124	92	109	123	133
	%FeO	99.2	6.72	5.15	4.62	6.32	5.40	6.10	6.70	6.50	10.3	7.70	5.80	5.40	4.30	7.00	5.80	4.90	5.60	3.10	6.50	5.30	6.20	6.45	7.77	5.16	5.14	6.38	8.04	4.97	4.54	4.91	7.66
Formation	Map Symbol	Tsh	Tsh	Tsh	Tsd	Tsd	Tsi	Tsi	Tsi	Tsi	Tsi	Tsa	Tsa	Tsh	Tsd	Tsh	Tsh	Tsd	Tsd	Tsd	Tsh	Tsh	Tsh	Tsh	Tsh	Tsd	Tsm	Tsm	Tsi	Tsi	Tsi	Tsi	Tsh
	Field No.	DS89019	DS89029	DS89030	DS89034	DS89035	88L-32	88L-34	88L-36	88L-61	89L-129	88L-31A	88L-31B	88L-31C	881-58	88L-62A	88L-62B	88L-62C	88L-62D	88L-62E	88 L-6 5	88 - -66	88L-70	89L-115	89L-122	89L-123	89L-128	89L-130	89L-135A	89L-135B	89L-143	89L-144	DY89-16

PZ	mdd	43	43	22	44	49	48	59	32	35	44	35	44	38	41	39	37	39	31	4	35
ပီ																					
۳	mdd	20	49	49	4	3	25	33	36	36	53	4	88	38	42	36	38	40	3	36	42
Ва	шдд	1294	1244	1289	1288	1234	1270	969	296	824	1043	1119	884	837	832	859	792	764	760	869	916
g	mdd	16	8	17	15	16	15	=	=	Ξ	4	=	18	18	5	17	=	9	9	∞	=
7	mdd	212	204	183	500	189	204	143	151	129	183	159	165	22	220	193	175	184	171	153	175
>	mdd	30	31	30	24	35	52	32	21	8	59	18	31	35	39	3	30	59	30	27	56
હ	mdd	867	881	821	804	880	891	703	728	711	539	741	512	764	762	779	656	726	661	662	688
윤	mdd	6	27	28	7	55	22	20	62	48	7	26	8	33	35	46	25	42	53	33	45
7	mdd	122	116	126	124	128	66	106	83	2	92	9	114	132	135	92	112	126	115	=======================================	99
	%FeO	7.00	7.69	6.72	6.12	7.83	6.81	6.88	4.53	4.31	2.73	3.25	7.44	8.23	8.17	5.70	6.87	7.74	6.11	7.81	5.41
Formation	Map Symbol	Tsa	Tsh	Tsh	Tsh	Tsh	Tsa	Ttm	Ttm	Tsi	Ttm	Ttm	Tsi	Ttm	Ttm	Ttm	Ttm	Ttm	Ttm T	Ttm	Ttm
	Field No.	DY89-17	DY89-18	DS89007	DS89008	DS89009	DS89010	89L-136	89L-137	89L-138	89L-140	89L-141	89L-147B	DY89-20	DY89-21	DY89-22	DY89-24	DY89-24B	DY89-25	DY89-26	DY89-27

Table 4. Rock type and general sample locality for volcanic rocks discussed in this report. For precise sample localities, see figure 2.

### Self-69 ### Se	Field No.	Formation Map Symbol	Rock Type And General Location
881-68 81-69 81-69 81-69 81-69 81-79 82-69 81-18 81-79 82-79 82-118 81-79 82-79 83-7	991-67	mb 2	venocrystic andesite flow on ridge W above head of
891-100 77 891-113 77 891-114 77 891-115 77 891-115 77 891-117 891-117 77 891-118 77 891-119 77 891-110 891-110 77 891-110 77 891-110 891-110 77 891-110 891-110 77 891-110 77 891-110 77 891-110 891-110 77 891-110 891-110 77 891-110 78 891-110 791-1			venocrystic andesite flow on ridge W shove Tuy Cree
891-100 77 891-113 77 891-114 77 891-115 77 891-115 77 891-117 891-117 77 891-118 77 891-119 77 891-110 891-110 77 891-110 77 891-110 891-110 77 891-110 891-110 77 891-110 77 891-110 77 891-110 891-110 77 891-110 891-110 77 891-110 78 891-110 791-1			xenocrystic andesite flow. W. above Red Mt. Creek
## Sepical State Sepical Sta			xenocrystic andesite on ridge between Ivy and Red Mt.
TRR-3 SSL-191 TT SSL-101 TT SSL-102 TT SSL-102 TT SSL-102 TT SSL-103 TT SSL-103 TT SSL-103 TT SSL-104 TT SSL-105 TT SSL-105 TT SSL-105 TT SSL-107 TT Accite flow, Notion Ivy Ck. DV89-10 TT Accite flow, bottom Ivy Ck. SSL-107 TSL-107 Maric dacite flow, SW of Fisher Ht. summit DV89-11A TT Accite flow, SW of Fisher Ht. summit DSS9001 TT Maric dacite flow, SW of Fisher Ht. summit DSS9001 TT Maric dacite flow, SW of Fisher Ht. DSS9001 TT SSSP001 TSL SSSP00			
### silicic dacite flow, at Magon Wheel Gap ### Silicic dacite flow, Provent Frail on Ivy Ck. ### Silicic dacite flow, Ivy Creek ### Silicic dacite flow, Fisher Creek trail ### Silicic dacite flow, S		Tpr	
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DS89016 Tsd dacite flow, bottom of Fisher Ck. DS89017 Tsa andesite flow, S of Beaut. Mt. DS89029 Tsh andesite flow, E. ridge on Beaut. Mt. DS89030 Tsh andesite flow, E. ridge on Beaut. Mt. DS89031 Tsd andesite flow, E. ridge on Beaut. Mt. DS89031 Tsd dacite flow, Beaut. Mt. DS89032 Tsd mafic dacite, N. Beaut. Mt. BS81-12 Tsi andesite dike, cutting Tmm S. of Pledra Pk. BS81-14 Tsi andesite intrusion, at head of W. Fk. San Juan R. BS81-15 Tsi andesite intrusion, an idge crest NE of Pledra peak BS81-16 Tsi andesite intrusion, E. of Pledra peak BS81-17 Tsi andesite intrusion, E. of SR peak BS81-18 Tsa andesite flow, on trail S. of SR peak BS81-19 Tsa andesite flow, on trail S. of SR peak BS81-10 Tsh andesite flow, on trail S. of SR peak BS81-10 Tsh andesite flow, on trail S. of SR peak BS81-27 Tsd andesite flow, NW of SR peak BS81-28 Tsd andesite flow, NW of SR peak BS81-29 Tsd andesite flow, NW of SR peak BS81-20 Tsd andesite flow, NW of SR peak BS81-20 Tsd andesite flow, NW of SR peak BS1-20 Tsd andesite flow, NW of SR peak BS1-21 Tsd andesite flow, NW of SR peak BS1-22 Tsd dacite, (slightly propylitized) BS1-23 Tsh andesite flow, head of Ivy Creek BS1-24 Tsh andesite flow, head of Ivy Creek BS1-10 Tsh andesite flow, head of Ivy Creek BS1-12 Tsh andesite flow, head of Ivy Creek BS1-12 Tsh andesite intrusion Savtooth trail SR peak BS1-12 Tsh andesite intrusion, upper Goose Ck. BS1-13 Tsh andesite flow, ridge SE of Goose lake BS1-13 Tsh andesite flow, ridge SE of Goose lake BS91-13 Tsh andesite flow, Se of Fisher Ck. BS91-13 Tsh andesite flow, Se of Sawtooth Mt., Cont. Divide BS91-13 Tsh andesite flow, No of Sawtooth Mt., Cont. Divide BS91-13 Tsh andesite flow, No of Sawtooth Mt., Cont. Divide BS91-13 Tsh andesite flow, No of Sawtooth Mt., Cont. Divide BS91-13 Tsh andesite flow, No of Sawtooth Mt., Cont. Divide BS91-14 Tsh andesite flow, No of Sawtooth Mt., Cont. Divide BS91-14 Tsh andesite flow, No of Sawtooth Mt., Cont. Divide BS91-14 Tsh andesite flow, No of Sawtooth Mt.	DY89-9	Tsd	mafic dacite flow, SW of summit on Beautiful Mt.
DSS9019 Tsh andesite flow, S of Beaut. Mt. DSS9019 Tsh andesite flow, E. ridge on Beaut. Mt. DSS9010 Tsh andesite flow, E. ridge on Beaut. Mt. DSS9010 Tsd andesite flow, E. ridge on Beaut. Mt. DSS9015 Tsd dacite flow, N. Beaut. Mt. BSS9015 Tsd mafic dacite, N. Beaut. Mt. SSS9015 Tsd mafic dacite, N. Beaut. Mt. SSS9015 Tsd andesite dike, cutting Tsm S. of Pledra Pk. SSS1-14 Tsi andesite intrusion, at head of W. Fk. San Juan R. SSS1-15 Tsi andesite intrusion, E. of Pledra Pk. SSS1-129 Tsi andesite intrusion, E. of Pledra Peak SSS1-129 Tsi andesite flow, on trail S. of SR peak SSS1-11A Tsa andesite flow, on trail S. of SR peak SSS1-11A Tsa andesite flow, on trail S. of SR peak SSS1-11B Tsa andesite flow, on trail S. of SR peak SSS1-11C Tsh andesite flow, on trail S. of SR peak SSS1-62A Tsh andesite flow, on trail S. of SR peak SSS1-62B Tsh andesite flow, NW of SR peak SSS1-62B Tsh andesite flow, below SR peak summit SSS1-15 Tsh andesite flow, below SR peak summit SSS1-15 Tsh andesite flow, below SR peak summit SSS1-15 Tsh andesite flow, below SR peak summit SSS1-12B Tsm andesite flow, nare trail at Goose Lake SSS1-121 Tsh andesite flow, near trail at Goose Lake SSS1-123 Tsh andesite flow, near trail at Goose Lake SSS1-13 Tsi andesite flow at Goose lake SSS1-13 Tsi andesite flow, near trail at Goose Lake SSS1-14 Tsi andesite flow, near trail at Goose Ck. SSS1-14 Tsi andesite flow, near trail at Goose Ck. SSS1-14 Tsi andesite flow, near trail at Goose Ck. SSS1-14 Tsi andesite flow, near trail at Goose Ck. SSS1-14 Tsi andesite flow, near trail at Goose Ck. SSS1-14 Tsi andesite flow, near trail at Goose Ck. SSS1-14 Tsi andesite flow, near trail at Goose Ck. SSS1-14 Tsi andesite flow, near trail at Goose Ck. SSS1-14 Tsi andesite flow, near trail at Goose Ck. SSSS1-14 Tsi andesite flow, near trail at Goose Ck. SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS	DS89016	Tsd	dacite flow, bottom of Fisher Ck.
DSS9010 Tsh andesite flow, E. ridge on Beaut. Mt. DSS9014 Tsd dacite flow, N. Beaut. Mt. 88L-32 Tsi mafic dacite, N. Beaut. Mt. 88L-34 Tsi andesite dike, cutting Tmm S. of Piedra Pk. 88L-36 Tsi andesite intrusion, at head of W. Fk. San Juan R. 88L-36 Tsi andesite intrusion, or ridge creat NE of Piedra peak 88L-318 Tsi andesite intrusion, E. of Piedra peak 88L-318 Tsa andesite flow, on trail S. of SR peak 88L-31B Tsa andesite flow, on trail S. of SR peak 88L-31C Tsh andesite flow, on trail S. of SR peak 88L-58 Tsd andesite flow, on trail S. of SR peak 88L-62A Tsh andesite flow, NW of SR peak 88L-62B Tsh andesite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd dacite flow, NW of SR peak 88L-62 Tsd dacite, (slightly propylitized) 88L-63 Tsh andesite flow, on trail S. of SR peak 88L-64 Tsh andesite flow, NW of SR peak 88L-65 Tsh andesite flow, NW of SR peak 88L-62 Tsd dacite, (slightly propylitized) 88L-63 Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-64 Tsh andesite flow, near trail at Goose Lake 88L-13 Tsh andesite flow, near trail at Goose Lake 88L-13 Tsh andesite flow and foose lake 89L-13 Tsd mafic dacite flow at Goose lake 89L-13 Tsd mafic dacite intrusion, upper Goose Ck. 89L-13 Tsi mafic dacite intrusion, upper Goose Ck. 89L-13 Tsi mafic dacite intrusion, upper Goose Ck. 89L-13 Tsi mafic dacite intrusion, upper Goose Ck. 89L-14 Tsi mafic dacite intrusion, upper Goose Ck. 89L-13 Tsh andesite flow, Se of Goose lake 89L-13 Tsh andesite flow, Se of Goose lake 89L-13 Tsh andesite flow, Se of Fisher Ck. 89L-14 Tsh andesite flow, No of Savtooth Mt., Cont. Divide 89L-13 Tsh andesite flow, No of Table Mt. 89L-14 Tsh andesite flow, No of Table	DS89017	Tsa	andesite flow, S of Beaut. Mt.
DSS9010 Tsh andesite flow, E. ridge on Beaut. Mt. DSS9014 Tsd dacite flow, N. Beaut. Mt. 88L-32 Tsi mafic dacite, N. Beaut. Mt. 88L-34 Tsi andesite dike, cutting Tmm S. of Piedra Pk. 88L-36 Tsi andesite intrusion, at head of W. Fk. San Juan R. 88L-36 Tsi andesite intrusion, or ridge creat NE of Piedra peak 88L-318 Tsi andesite intrusion, E. of Piedra peak 88L-318 Tsa andesite flow, on trail S. of SR peak 88L-31B Tsa andesite flow, on trail S. of SR peak 88L-31C Tsh andesite flow, on trail S. of SR peak 88L-58 Tsd andesite flow, on trail S. of SR peak 88L-62A Tsh andesite flow, NW of SR peak 88L-62B Tsh andesite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd dacite flow, NW of SR peak 88L-62 Tsd dacite, (slightly propylitized) 88L-63 Tsh andesite flow, on trail S. of SR peak 88L-64 Tsh andesite flow, NW of SR peak 88L-65 Tsh andesite flow, NW of SR peak 88L-62 Tsd dacite, (slightly propylitized) 88L-63 Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-64 Tsh andesite flow, near trail at Goose Lake 88L-13 Tsh andesite flow, near trail at Goose Lake 88L-13 Tsh andesite flow and foose lake 89L-13 Tsd mafic dacite flow at Goose lake 89L-13 Tsd mafic dacite intrusion, upper Goose Ck. 89L-13 Tsi mafic dacite intrusion, upper Goose Ck. 89L-13 Tsi mafic dacite intrusion, upper Goose Ck. 89L-13 Tsi mafic dacite intrusion, upper Goose Ck. 89L-14 Tsi mafic dacite intrusion, upper Goose Ck. 89L-13 Tsh andesite flow, Se of Goose lake 89L-13 Tsh andesite flow, Se of Goose lake 89L-13 Tsh andesite flow, Se of Fisher Ck. 89L-14 Tsh andesite flow, No of Savtooth Mt., Cont. Divide 89L-13 Tsh andesite flow, No of Table Mt. 89L-14 Tsh andesite flow, No of Table			andesite flow, S of Beaut. Mt.
DS89034 Tsd mafic dacite, N. Beaut. Mt. 88L-32 Tsi andesite dike, cutting Tmm S. of Piedra Pk. 88L-34 Tsi andesite intrusion, at head of W. Fk. San Juan R. 88L-61 Tsi andesite intrusion, on ridge crest NE of Piedra peak 88L-62 Tsi andesite intrusion, on ridge crest NE of Piedra peak 88L-118 Tsi andesite flow, on trail S. of SR peak 88L-318 Tsa andesite flow, on trail S. of SR peak 88L-318 Tsa andesite flow, on trail S. of SR peak 88L-31C Tsh andesite flow, on trail S. of SR peak 88L-58 Tsd andesite flow, wo fraping Piedra Pk. 88L-62A Tsh andesite flow, NW of SR peak 88L-62B Tsd andesite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62E Tsd dacite flow, NW of SR peak 88L-62E Tsd dacite, (slightly propylitized) 88L-65 Tsh andesite flow, no ridge S. above head of Ivy Creek 88L-70 Tsh andesite flow, below SR peak summit 88L-115 Tsh andesite flow, head of Ivy Ck. 89L-123 Tsd andesite flow, head of Ivy Ck. 89L-124 Tsm andesite flow and from the form of			andesite flow, E. ridge on Beaut. Mt.
DS89035 Tsd mafic dacite, N. Beaut. Mt. 88L-32 Tsi andesite dike, cutting Tmm S. of Piedra Pk. 88L-34 Tsi andesite dike, cutting Tmm S. of Piedra Pk. 88L-36 Tsi andesite intrusion, at head of W. Fk. San Juan R. 88L-61 Tsi andesite intrusion, E. of Piedra peak 88L-31A Tsi andesite dike, E. of SR peak 88L-31B Tsa andesite flow, on trail S. of SR peak 88L-31B Tsa andesite flow, on trail S. of SR peak 88L-31C Tsh andesite flow, on trail S. of SR peak 88L-62B Tsd andesite flow, Nw of SR peak 88L-62B Tsh andesite flow, Nw of SR peak 88L-62B Tsh andesite flow, Nw of SR peak 88L-62C Tsd mafic dacite flow, Nw of SR peak 88L-62D Tsd mafic dacite flow, Nw of SR peak 88L-62D Tsd mafic dacite flow, Nw of SR peak 88L-63D Tsh andesite flow, on rridge S. above head of Ivy Creek 88L-64D Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-65 Tsh andesite flow, below SR peak summit 88L-65 Tsh andesite flow, wa bore Red Mt. Creek 88L-70 Tsh andesite flow, wa bore Red Mt. Creek 89L-115 Tsh andesite flow, wa bore Red Mt. Creek 89L-122 Tsh andesite flow, head of Ivy Ck. 89L-123 Tsd mafic dacite rlow at Goose lake 89L-124 Tsd mafic dacite mudflow clast, E. of SR peak 89L-135 Tsi andesite flow clast, E. of SR peak 89L-135 Tsi andesite flow, ridge SE of Goose Ck. 89L-135 Tsi andesite flow, ridge SE of Goose Lake 89L-135 Tsi andesite flow, ridge SE of Goose lake 10199-14 Tsi andesite flow, ridge SE of Goose lake 10199-16 Tsh andesite flow, SE of Fisher Ck. 10199-18 Tsh andesite flow, SE of Fisher Ck. 10199-18 Tsh andesite flow, SE of Fisher Ck. 10199-19 Ttm andesite flow, SE of Fisher Ck. 10199-19 Ttm andesite flow, No of Sawtooth Mt., Cont. Divide 10199-21 Ttm andesite flow, No of Table Mt. 10199-22 Ttm andesite flow, No of Table Mt. 10199-23 Ttm andesite flow, No of Table Mt. 10199-24 Ttm andesite flow, No of Sawtooth Mt. 10199-25 Ttm andesite flow, No of Sawtooth Mt. 10199-26 Ttm andesite flow, No of Sawtooth Mt.			
88L-32 Tsi andesite dike, cutting Tmm S. of Pledra Pk. 88L-36 Tsi andesite intrusion, at head of W. Fk. San Juan R. 88L-36 Tsi andesite intrusion, on ridge crest NE of Piedra peak 88L-318 Tsi andesite dike, E. of SR peak 88L-318 Tsa andesite flow, on trail S. of SR peak 88L-318 Tsa andesite flow, on trail S. of SR peak 88L-318 Tsa andesite flow, on trail S. of SR peak 88L-318 Tsd andesite flow, on trail S. of SR peak 88L-58 Tsd mafic dacite flow, Capping Piedra Pk. 88L-62A Tsh andesite flow, NW of SR peak 88L-62B Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd mafic dacite flow, NW of SR peak 88L-65 Tsh andesite flow, below SR peak summit 88L-66 Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-70 Tsh andesite flow, Nw above Red Mt. Creek 88L-712 Tsh andesite flow, near trail at Goose Lake 89L-123 Tsd mafic dacite flow at Goose lake 89L-123 Tsd mafic dacite flow at Goose lake 89L-123 Tsd mafic dacite flow at Goose lake 89L-135 Tsi andesite mudflow clast, E. of SR peak 89L-135 Tsi andesite intrusion, upper Goose Ck. 89L-135 Tsi andesite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-145 Tsh andesite flow, ridge SE of Goose lake 89L-136 Tsh andesite flow, Fide SE of Goose lake 89L-137 Tsh andesite flow, E. of Goose Lake 89L-148 Tsh andesite flow, SE of Goose lake 89L-149 Tsh andesite flow, SE of Goose lake 89L-140 Ttm silicic dacite flow, We of Sawtooth Mt., Cont. Divide 89L-137 Ttm dacite intrusion, upper Goose Ck. 89L-138 Tsh andesite flow, SE of Goose lake 89L-139 Tsh andesite flow, We of Sawtooth Mt., Cont. Divide 89L-140 Ttm silicic dacite flow, We of Sawtooth Mt. Cont. Divide 89L-141 Ttm andesite flow, No of Sawtooth Mt. 89L-148 Tsi andesite flow, No of Sawtooth Mt. 89L-149 Ttm andesite flow, No of Sawtooth Mt.			
88L-34 Tsi andesite intrusion, at head of W. Fk. San Juan R. 88L-61 Tsi andesite intrusion, on ridge crest NE of Piedra peak 88L-31A Tsa andesite dikk, E. of SR peak 88L-31B Tsa andesite flow, on trail S. of SR peak 88L-31B Tsa andesite flow, on trail S. of SR peak 88L-31C Tsh andesite flow, on trail S. of SR peak 88L-58 Tsd andesite flow, on trail S. of SR peak 88L-62B Tsh andesite flow, NW of SR peak 88L-62B Tsh andesite flow, NW of SR peak 88L-62B Tsh andesite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow and flow flow flow flow flow flow flow flow			andesite dike, cutting Tmm S. of Piedra Pk.
88L-56 88L-61 751 88L-61 752 88L-31A 753 88L-31B 753 88L-31B 753 88L-31B 753 88L-31B 753 88L-31B 754 88L-31B 755 88L-52B 755 756 88L-52B 757 88L-62A 757 88L-62A 758 88L-62B 758 758 758 758 758 758 758 758 758 758			andesite intrusion, at head of W. Fk. San Juan R.
89L-129 Tsi andesite dike, E. of SR peak 88L-31B Tsa andesite flow, on trail S. of SR peak 88L-31B Tsa andesite flow, on trail S. of SR peak 88L-13B Tsa andesite flow, on trail S. of SR peak 88L-58 Tsd mafic dacite flow, capping Piedra Pk. 88L-62B Tsh andesite flow, NW of SR peak 88L-62B Tsh andesite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62E Tsd dacite flow, NW of SR peak 88L-62E Tsd dacite, (slightly propylitized) 88L-65 Tsh andesite flow, below SR peak summit 88L-66 Tsh andesite flow, woo SR peak summit 88L-66 Tsh andesite flow, woo SR peak summit 88L-61 Tsh andesite flow, below SR peak summit 88L-62 Tsd dacite, (slightly propylitized) 88L-62 Tsd andesite flow, below SR peak summit 88L-63 Tsh andesite flow, below SR peak summit 88L-10 Tsh andesite flow, woo ridge S. above head of Ivy Creek 88L-115 Tsh andesite flow, head of Ivy Ck. 89L-112 Tsd mafic dacite flow at Goose Lake 89L-121 Tsd mafic dacite flow at Goose Lake 89L-121 Tsd mafic dacite mudflow clast, E. of SR peak 89L-135 Tsi mafic dacite mudflow clast, E. of SR peak 89L-135 Tsi mafic dacite intrusion, upper Goose Ck. 89L-136 Tsi mafic dacite intrusion, upper Goose Ck. DY89-16 Tsh andesite flow, ridge SE of Goose lake 10 DY89-17 Tsa andesite flow, ridge SE of Goose lake 10 DY89-18 Tsh andesite flow, For Goose Ck 10 DS89007 Tsh andesite flow, Se of Goose lake 10 DS89009 Tsh andesite flow, Se of Fisher Ck. 10 S89009 Tsh andesite flow, Se of Fisher Ck. 10 S89009 Tsh andesite flow, Se of Fisher Ck. 10 S891-136 Ttm silicic dacite flow, wo of Sawtooth Mt., Cont. Divide 10 S9L-138 Tsi dacite intrusion, upper Goose Ck. 11 DY89-20 Ttm andesite flow, NW of Table Mt. 12 DY89-24 Ttm andesite flow, No of Sawtooth Mt., cont. Divide 13 S9L-14 Ttm andesite flow, No of Sawtooth Mt., summit 14 Andesite flow, No of Sawtooth Mt. 15 DY89-24 Ttm andesite flow, No of Sawtooth Mt. 16 DY89-25 Ttm andesite flow, No of Sawtooth Mt.	88L-36	Tsi	andesite intrusion, on ridge crest NE of Pledra peak
88L-31B Tsa andesite flow, on trail S. of SR peak 88L-31C Tsh andesite flow, on trail S. of SR peak 88L-58 Tsd mafic dactic flow, capping Piedra Pk. 88L-62B Tsh andesite flow, NW of SR peak 88L-62B Tsh andesite flow, NW of SR peak 88L-62C Tsd mafic dacte flow, NW of SR peak 88L-62C Tsd mafic dacte flow, NW of SR peak 88L-62E Tsd dacite, (slightly propylitized) 88L-65 Tsh andesite flow, NW of SR peak 88L-66 Tsh andesite flow, or ridge S. above head of Ivy Creek 88L-70 Tsh andesite flow, w. above Red Mt. Creek 88L-70 Tsh andesite flow, w. above Red Mt. Creek 89L-115 Tsh andesite flow, head of Ivy Ck. 89L-123 Tsd mafic dacte flow at Goose Lake 89L-124 Tsh andesite flow at Goose lake 89L-125 Tsh andesite mudflow clast, E. of SR peak 89L-130 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135A Tsi mafic dacite intrusion, sawtooth trail 89L-135B Tsi mafic dacite intrusion, upper Goose Ck. 89L-141 Tsi mafic dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-145 Tsh andesite flow, ridge SE of Goose lake 89L-18 Tsh andesite flow, ridge SE of Goose lake 89L-18 Tsh andesite flow, For Goose Ck. 89L-19 Tsh andesite flow, For Goose Ck. 89L-10 Tsh andesite flow, SE of Goose lake 89L-10 Tsh andesite flow, SE of Goose Ck 89L-10 Tsh andesite flow, SE of Fisher Ck. 89L-11 Ttm solicic dacite flow, SE of Fisher Ck. 89L-11 Ttm solicic dacite flow, No of Sawtooth Mt. Cont. Divide 89L-11 Ttm andesite flow, No of Table Mt. 89L-11 Ttm andesite flow, No of Sawtooth Mt. summit 89L-12 Ttm andesite flow, No of Sawtooth Mt. 89L-14 Ttm andesite flow, No of Sawtooth Mt. 89L-14 Ttm andesite flow, No of Sawtooth Mt.			andesite intrusion, E. of Piedra peak
88L-11B Tsa andesite flow, on trail S. of SR peak 88L-51C Tsh andesite flow, capping Piedra Pk. 88L-62B Tsh andesite flow, NW of SR peak 88L-62B Tsh andesite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd mafic dacite flow, NW of SR peak 88L-62E Tsd dacite, (slightly propylitized) 88L-65 Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-66 Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-70 Tsh andesite flow, near trail at Goose Lake 89L-115 Tsh andesite flow, near trail at Goose Lake 89L-122 Tsh andesite flow at Goose lake 89L-128 Tsm mafic dacite mudflow clast?, E. of SR peak 89L-130 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135B Tsi andesite intrusion, Sawtooth trail 89L-135B Tsi andesite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-144 Tsi andesite flow, ridge SE of Goose lake DY89-17 Tsa andesite flow, ridge SE of Goose lake DY89-18 Tsh andesite flow, of Goose Ck. DS89008 Tsh andesite flow, se of Goose Ck. BS9009 Tsh andesite flow, SE of Fisher Ck. BS9009 Tsh andesite flow, SE of Fisher Ck. BS9009 Tsh andesite flow, SE of Goose Ck. BS91-140 Ttm shick capter flow, SE of Goose Ck. BS91-141 Ttm dacite flow, SE of Goose Ck. BS91-142 Ttm andesite flow, SE of Goose Ck. BS91-143 Tsi dacite intrusion, upper Goose Ck. BS91-144 Tsi andesite flow, SE of Fisher Ck. DS89009 Tsh andesite flow, SE of Fisher Ck. DS89010 Tsa andesite flow, SE of Fisher Ck. BS91-136 Tsh andesite flow, SE of Fisher Ck. DS89010 Tsa andesite flow, SE of Goose Ck. near cont. divide BS1-141 Ttm shick andesite flow, No of Sawtooth Mt., Cont. Divide BS1-141 Ttm andesite flow, No of Sawtooth Mt., Cont. Divide BS1-147 Ttm andesite flow, No of Table Mt. DY89-20 Ttm andesite flow, No of Table Mt. DY89-21 Ttm andesite flow, No of Table Mt. DY89-22 Ttm andesite flow, No of Sawtooth Mt. BNG-12B Ttm andesite flow, Ne of Sawtooth Mt. BNG-12B Ttm andesite flow, Ne of Sawtooth Mt.		_	andesite dike, E. of SR peak
88L-58 88L-62A 88L-62A 88L-62B 88L-62B 88L-62C 38L-62C 3RL-62C			andesite flow, on trail S. of SR peak
88L-62B Tsh andesite flow, NW of SR peak 88L-62B Tsh andesite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd mafic dacite flow, NW of SR peak 88L-62E Tsd dacite, (slightly propylitized) 88L-65 Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-66 Tsh andesite flow, no ridge S. above head of Ivy Creek 88L-70 Tsh andesite flow, head of Ivy Ck. 89L-115 Tsh andesite flow, head of Ivy Ck. 89L-122 Tsh andesite flow at Goose lake 89L-123 Tsd mafic dacite flow at Goose lake 89L-128 Tsm mafic dacite mudflow clast?, E. of SR peak 89L-135 Tsi mafic dacite intrusion, Sawtooth trail 89L-135 Tsi mafic dacite intrusion, upper Goose Ck. 89L-135 Tsi dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-144 Tsi dacite intrusion, upper Goose Ck. 89L-144 Tsi andesite flow, ridge SE of Goose lake 89L-145 Tsh andesite flow, ridge SE of Goose lake 89L-16 Tsh andesite flow, ridge SE of Goose lake 89S-16 Tsh andesite flow, SE of Goose Lake 89S-17 Tsh andesite flow, SE of Goose Lake 89S-189007 Tsh andesite flow, SE of Goose Lake 89S-10 Tsh andesite flow, SE of Goose Lake 89S-10 Tsh andesite flow, SE of Goose Ck. 89L-136 Ttm andesite flow, SE of Goose Lake 89L-137 Ttm andesite flow, SE of Goose Ck. 89L-140 Ttm silicic dacite flow, upper Goose Ck. 89L-141 Ttm silicic dacite flow, upper Goose Ck. 89L-140 Ttm silicic dacite flow, upper Goose Ck. 89L-141 Ttm silicic dacite flow, upper Goose Ck. 89L-142 Ttm andesite flow, No of Sawtooth Mt., Cont. Divide 89L-143 Tsi andesite flow, No of Sawtooth Mt. summit 89L-146 Ttm andesite flow, No of Table Mt. 89L-147 Ttm andesite flow, No of Sawtooth Mt. 89L-148 Ttm andesite flow, No of Sawtooth Mt. 89L-149 Ttm andesite flow, No of Sawtooth Mt. 89L-140 Ttm andesite flow, No of Sawtooth Mt. 89L-141 Ttm andesite flow, No of Sawtooth Mt. 89L-142 Ttm andesite flow, No of Sawtooth Mt. 89L-143 Ttm andesite flow, No of Sawtooth Mt. 89L-145 Ttm andesite flow, No of Sawtooth Mt.			andesite flow, on trail S. of SR neak
88L-62A Tsh andesite flow, NW of SR peak 88L-62C Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd mafic dacite flow, NW of SR peak 88L-62E Tsd dacite, (slightly propylitized) 88L-65 Tsh andesite flow, below SR peak summit 88L-66 Tsh andesite flow, or ridge S. above head of Ivy Creek 88L-70 Tsh andesite flow, w. above Red Mt. Creek 88L-70 Tsh andesite flow, near trail at Goose Lake 89L-115 Tsh andesite flow, near trail at Goose Lake 89L-121 Tsd mafic dacite flow at Goose Lake 89L-123 Tsm andesite mudflow clast, E. of SR peak 89L-130 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135A Tsi andesite intrusion, Sawtooth trail 89L-135B Tsi mafic dacite intrusion, upper Goose Ck. 89L-141 Tsi mafic dacite intrusion, upper Goose Ck. 89L-141 Tsi mafic dacite intrusion, upper Goose Ck. 89L-141 Tsi mafic dacite intrusion, upper Goose Ck. 89L-143 Tsi mafic dacite intrusion, upper Goose Ck. 89L-140 Tsi mafic dacite intrusion, upper Goose Ck. 89L-141 Tsi mafic dacite intrusion, upper Goose Ck. 89L-143 Tsi mafic dacite intrusion, upper Goose Ck. 89L-140 Tsi mafic dacite intrusion, upper Goose Ck. 89S9007 Tsh andesite flow, ridge SE of Goose lake 89S9009 Tsh andesite flow, E. of Goose Lake 89S9009 Tsh andesite flow, E. of Goose Lake 89L-136 Ttm andesite flow, SE of Fisher Ck. 89L-137 Ttm dacite flow, SE of Fisher Ck. 89L-140 Ttm silicic dacite flow, w. of Sawtooth Mt., Cont. Divide 89L-147 Ttm silicic dacite flow, upper Goose Ck. 89L-147 Ttm silicic dacite flow, upper Goose Ck. 89L-147 Ttm silicic dacite flow, upper Goose Ck. 89L-147 Ttm silicic dacite flow, w. of Sawtooth Mt., Cont. Divide 89L-148 Tsi andesite intrusion, upper Goose Ck. 89L-149 Ttm andesite flow, NW of Table Mt. 89L-148 Tsi andesite flow, NW of Table Mt. 89L-149-24 Ttm andesite flow, NE of Sawtooth Mt. summit 89L-25 Ttm andesite flow, NE of Sawtooth Mt. 80L-26 Ttm andesite flow, NE of Sawtooth Mt.			mafic dacite flow, capping Piedra Pk.
88L-62E Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd mafic dacite flow, NW of SR peak 88L-62D Tsd dacite, (slightly propylitized) 88L-65 Tsh andesite flow, below SR peak summit 88L-66 Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-70 Tsh andesite flow, we above Red Mt. Creek 89L-115 Tsh andesite flow, head of Ivy Ck. 89L-122 Tsh andesite flow, head of Ivy Ck. 89L-123 Tsd mafic dacite flow at Goose lake 89L-123 Tsd mafic dacite flow at Goose lake 89L-124 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135A Tsi mafic dacite intrusion, Sawtooth trail 89L-135A Tsi mafic dacite intrusion, upper Goose Ck. 89L-141 Tsi mafic dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-145 Tsh andesite flow, ridge SE of Goose lake 89L-16 Tsh andesite flow, ridge SE of Goose lake 89L-17 Tsa andesite flow, E. of Goose Lake 89S-18 Tsh andesite flow, E. of Goose Lake 89S-10 Tsh andesite flow, SE of Goose Lake 89S-10 Tsh andesite flow, SE of Goose Ck 89L-136 Tsh andesite flow, SE of Goose Ck. 89L-137 Tsh andesite flow, SE of Goose Lake 89L-137 Ttm andesite flow, SE of Goose Ck. 89L-140 Ttm silicic dacite flow, W. of Sawtooth Mt., Cont. Divide 89L-147 Tsi andesite flow, W. of Sawtooth Mt., Cont. Divide 89L-148 Tsi andesite flow, W. of Sawtooth Mt., Cont. Divide 89L-149 Ttm silicic dacite flow, we of Sawtooth Mt. Selection of Sawtooth Mt. 89L-147 Ttm andesite flow, NW of Table Mt. 89L-148 Tsi andesite intrusion, upper Goose Ck. 89L-149 Ttm andesite flow, NW of Table Mt. 89L-24 Ttm andesite flow, NW of Table Mt. 89L-24 Ttm andesite flow, NE of Sawtooth Mt. summit 89L-24 Ttm andesite flow, NE of Sawtooth Mt. 89L-24 Ttm andesite flow, NE of Sawtooth Mt.		- •	andesite flow, NW of SR peak
88L-62D Tsd dacite flow, NW of SR peak 88L-65 Tsh andesite flow, below SR peak summit 88L-66 Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-70 Tsh andesite flow, w. above Red Mt. Creek 89L-115 Tsh andesite flow, head of Ivy Ck. 89L-121 Tsh andesite flow, near trail at Goose Lake 89L-122 Tsh andesite flow at Goose lake 89L-123 Tsd mafic dacite flow at Goose lake 89L-128 Tsm andesite mudflow clast?, E. of SR peak 89L-130 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135A Tsi andesite intrusion, Sawtooth trail 89L-135B Tsi mafic dacite intrusion, upper Goose Ck. 89L-144 Tsi dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-145 Tsi andesite flow, ridge SE of Goose lake DY89-16 Tsh andesite flow, ridge SE of Goose lake DY89-18 Tsh andesite flow, N. of Goose Ck DY89-18 Tsh andesite flow, E. of Goose lake DS89007 Tsh andesite flow, SE of Fisher Ck SE of Goose lake DS89009 Tsh andesite flow, SE of Goose lake DS89009 Tsh andesite flow, SE of Fisher Ck. 89L-136 Ttm dacite flow, SE of Fisher Ck. 89L-137 Ttm dacite flow, SE of Foose Ck. 89L-138 Tsi dacite intrusion, W. of Sawtooth Mt., Cont. Divide 89L-138 Tsi dacite flow, Cont. Divide 89L-137 Ttm silicic dacite flow, upper Goose Ck. 89L-140 Ttm silicic dacite flow, upper Goose Ck. 89L-147 Tsi andesite flow, No of Sawtooth Mt., Cont. Divide 89L-147 Tsi andesite flow, No of Sawtooth Mt. Cont. Divide 89L-147 Tsi andesite flow, No of Table Mt. 10189-22 Ttm andesite flow, No of Sawtooth Mt. Summit 10189-24 Ttm andesite flow, No of Sawtooth Mt. Summit 10189-24 Ttm andesite flow, No of Sawtooth Mt. 10189-25 Ttm andesite flow, near base of Sawtooth Mt. 10189-26 Ttm andesite flow, near base of Sawtooth Mt. 10189-26 Ttm andesite flow, near base of Sawtooth Mt.	88L-62B	Tsh	andesite flow, NW of SR peak
88L-62E Tsh andesite flow, below SR peak summit 88L-66 Tsh andesite flow, whead of Ivy Creek 88L-70 Tsh andesite flow, whead of Ivy Creek 88L-70 Tsh andesite flow, whead of Ivy Ck. 89L-115 Tsh andesite flow, head of Ivy Ck. 89L-122 Tsh andesite flow, near trail at Goose Lake 89L-123 Tsd mafic dacite flow at Goose lake 89L-130 Tsm andesite mudflow clast, E. of SR peak 89L-130 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135A Tsi andesite intrusion, Sawtooth trail 89L-135B Tsi maric dacite intrusion, upper Goose Ck. 89L-143 Tsi dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. DY89-16 Tsh andesite flow, ridge SE of Goose lake DY89-17 Tsa andesite flow, ridge SE of Goose lake DY89-18 Tsh andesite flow, N. of Goose Ck DS89007 Tsh andesite flow, E. of Goose Lake DS89008 Tsh andesite flow, E. of Goose Lake DS89009 Tsh andesite flow, SE of Fisher Ck SE of Goose lake DS89010 Tsa andesite flow, SE of Fisher Ck. 89L-136 Ttm dacite flow, SE of Goose Ck. 89L-137 Ttm dacite flow, Cont. Divide 89L-138 Tsi dacite intrusion, W. of Sawtooth Mt., Cont. Divide 89L-140 Ttm silicic dacite flow, upper Goose Ck. 89L-141 Ttm silicic dacite flow, upper Goose Ck. 89L-147 Tsi andesite flow, N. of Sawtooth Mt., Cont. Divide 89L-147 Tsi andesite flow, N. of Sawtooth Mt. cont. Divide 89L-148 Tsi andesite flow, N. of Sawtooth Mt. summit DY89-21 Ttm andesite flow, N. of Sawtooth Mt. summit DY89-24 Ttm andesite flow, N. of Sawtooth Mt. summit DY89-24 Ttm andesite flow, N. of Sawtooth Mt. summit DY89-24 Ttm andesite flow, N. of Sawtooth Mt. summit DY89-24 Ttm andesite flow, N. of Sawtooth Mt. DY89-26 Ttm andesite flow, N. of Sawtooth Mt. DY89-26 Ttm andesite flow, N. of Sawtooth Mt.			mafic dacite flow, NW of SR peak
88L-65 88L-66 88L-70 Tsh andesite flow, on ridge S. above head of Ivy Creek 88L-70 Tsh andesite flow, w. above Red Mt. Creek 89L-115 Tsh andesite flow, head of Ivy Ck. 89L-122 Tsh andesite flow, near trail at Goose Lake 89L-123 R9L-128 R9L-128 R9L-135 R9L-14 Tsi mafic dacite intrusion, Sawtooth trail R9L-135 R9L-14 R9L-135 R9L-14 R9L-135 R9L-14 R9L-135 R9L-14 R9L-135 R9L-14 R9L-135 R9L-14 R9L-136 R9L-136 R9L-136 R9L-136 R9L-136 R9L-136 R9L-136 R9L-136 R9L-137 R9L-138 R9L-138 R9L-140 R9L-138 R9L-140 R9L-138 R9L-140 R9L-138 R9L-140 R9L-147 R9L-138 R9L-147 R9L-138 R9L-140 R9L-148 R9L-140 R9L-148 R9L-149 R9L-149 R9L-140 R9L-140 R9L-140 R9L-141 R9L-147 R9L-14			
88L-66 88L-70 Tsh andesite flow, on ridge S. above head of Ivy Creek 89L-10 Tsh andesite flow, head of Ivy Ck. 89L-122 Tsh andesite flow, head of Ivy Ck. 89L-123 Tsd andesite flow, near trail at Goose Lake 89L-123 Tsd mafic dacite flow at Goose lake 89L-130 Tsm andesite mudflow clast?, E. of SR peak 89L-130 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135B Tsi andesite intrusion, sawtooth trail 89L-135B Tsi mafic dacite intrusion, upper Goose Ck. 89L-143 Tsi dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. DY89-16 DY89-17 Tsa andesite flow, ridge SE of Goose lake DY89-17 DY89-18 DY89-18 Tsh andesite flow, ridge SE of Goose lake DS89007 Tsh andesite flow, E. of Goose Lake DS89008 DS89007 Tsh andesite flow, E. of Goose Lake DS89009 DS89010 Tsa andesite flow, SE of Fisher Ck. 89L-137 Ttm andesite flow, SE of Fisher Ck. 89L-138 Tsi dacite intrusion, W. of Sawtooth Mt., Cont. Divide 89L-137 Ttm dacite flow, Cont. Divide 89L-141 Ttm silicic dacite flow, upper Goose Ck. BY89-20 Ttm andesite flow, Nw of Table Mt. DY89-21 Ttm andesite flow, Nw of Table Mt. DY89-24 Ttm andesite flow, Ne of Sawtooth Mt. summit DY89-24 DY89-26 Ttm andesite flow, Ne of Sawtooth Mt. DY89-26 Ttm andesite flow, Ne of Sawtooth Mt. DY89-26 Ttm andesite flow, Ne of Sawtooth Mt.			
88L-70 89L-115 89L-122 Tsh andesite flow, head of Ivy Ck. 89L-123 S9L-123 Tsd mafic dacite flow at Goose Lake 89L-128 89L-128 89L-130 Tsm mafic dacite mudflow clast, E. of SR peak 89L-130 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135A S9L-135B S9L-135B S9L-135B S9L-143 S9L-144 Tsi mafic dacite intrusion, Sawtooth trail 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. 89L-147 DY89-16 DY89-16 DY89-17 Tsa andesite flow, ridge SE of Goose lake DY89-18 DY89-18 DY89-18 DY89-19 DY89-18 DY89-19 DY89-18 DY89-19 Tsh andesite flow, N. of Goose Ck DS89007 DS89008 DS89009 Tsh andesite flow, E. of Goose Lake DS89009 DS89010 Tsa andesite flow, SE of Goose lake DS89010 S9L-136 S9L-137 Ttm dacite flow, S. of Goose Ck. 89L-138 S9L-140 Ttm slicic dacite flow, W. of Sawtooth Mt., Cont. Divide 89L-138 S9L-140 Ttm slicic dacite flow, upper Goose Ck. B9L-141 S9L-148 DY89-20 Ttm andesite flow, Nw of Table Mt. DY89-21 Ttm andesite flow, Ne of Sawtooth Mt. summit DY89-24 Ttm andesite flow, Ne of Sawtooth Mt. DY89-24 Ttm andesite flow, Ne of Sawtooth Mt. DY89-24 Ttm andesite flow, Ne of Sawtooth Mt. DY89-24 DY89-26 Ttm andesite flow, Ne of Sawtooth Mt.			andesite flow, below Sk peak summit
89L-115 89L-122 Tsh andesite flow, head of Ivy Ck. 89L-123 Tsd mafic dacite flow at Goose Lake 89L-128 R9L-128 R9L-130 R9L-130 R9L-135A R9L-135A R9L-135B R5i mafic dacite mudflow clast, E. of SR peak R9L-135B R9L-135B R5i mafic dacite intrusion, Sawtooth trail R9L-135B R9L-141 R9L-144 R9L-144 R9L-145 R9L-145 R9L-145 R9L-146 R9L-146 R9L-147 R9L-147 R9L-148 R9L-148 R9L-149 R9L-149 R9L-149 R9L-149 R9L-140 R9L-140 R9L-140 R9L-140 R9L-141 R9L-136 R9L-137 R9L-138 R9L-136 R9L-137 R9L-138 R9L-140 R9L-137 R9L-138 R9L-140 R9L-141 R9L-141 R9L-141 R9L-147			
89L-122 Tsh andesite flow, near trail at Goose Lake 89L-123 Tsd mafic dacite flow at Goose lake 89L-126 Tsm andesite mudflow clast?, E. of SR peak 89L-1350 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135A Tsi andesite intrusion, Sawtooth trail 89L-135B Tsi mafic dacite intrusion, upper Goose Ck. 89L-143 Tsi dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. DY89-16 Tsh andesite flow, ridge SE of Goose lake DY89-17 Tsa andesite flow, ridge SE of Goose lake DY89-18 Tsh andesite flow, N. of Goose Ck DS89007 Tsh andesite flow, E. of Goose Lake DS89008 Tsh andesite flow, E. of Goose Lake DS89009 Tsh andesite flow, SE of Fisher Ck SE of Goose lake DS89010 Tsa andesite flow, S. of Goose Ck. 89L-136 Ttm andesite flow, S. of Goose Ck. near cont. divide 89L-137 Ttm dacite flow, Cont. Divide 89L-138 Tsi dacite intrusion, W. of Sawtooth Mt., Cont. Divide 89L-140 Ttm silicic dacite flow, W. of Sawtooth Mt., Cont. Divide 89L-141 Ttm silicic dacite flow, upper Goose Ck. BY89-20 Ttm andesite flow, NW of Table Mt. DY89-21 Ttm andesite flow, NW of Table Mt. DY89-24 Ttm andesite flow, NE of Sawtooth Mt. summit DY89-24 Ttm andesite flow, NE of Sawtooth Mt. summit DY89-26 Ttm andesite flow, Ne of Sawtooth Mt.			andesite flow, head of Ivy Ck.
89L-123 Tsm andesite mudflow clast?, E. of SR peak 89L-130 Tsm mafic dacite mudflow clast, E. of SR peak 89L-135A Tsi andesite intrusion, Sawtooth trail 89L-135B Tsi mafic dacite intrusion, upper Goose Ck. 89L-143 Tsi dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. DY89-16 Tsh andesite flow, ridge SE of Goose lake DY89-17 Tsa andesite flow, ridge SE of Goose lake DY89-18 Tsh andesite flow, N. of Goose Ck DS89007 Tsh andesite flow, E. of Goose Lake DS89008 Tsh andesite flow, SE of Goose lake DS89009 Tsh andesite flow, SE of Fisher Ck SE of Goose lake DS89010 Tsa andesite flow, SE of Fisher Ck. 89L-136 Ttm andesite flow, S. of Goose Ck. near cont. divide 89L-137 Ttm dacite flow, Cont. Divide 89L-138 Tsi dacite intrusion, W. of Sawtooth Mt., Cont. Divide 89L-140 Ttm silicic dacite flow, upper Goose Ck. 89L-141 Ttm silicic dacite flow, upper Goose Ck. 89L-147B Tsi andesite flow, NW of Table Mt. DY89-20 Ttm andesite flow, NW of Table Mt. DY89-24 Ttm andesite flow, NE of Sawtooth Mt. summit DY89-24 Ttm andesite flow, NE of Sawtooth Mt. summit DY89-24 Ttm andesite flow, NE of Sawtooth Mt. DY89-25 Ttm andesite flow, Ne of Sawtooth Mt. DY89-26 Ttm andesite flow, Ne of Sawtooth Mt.			andesite flow, near trail at Goose Lake
89L-135A 89L-135A 89L-135B 89L-135B Tsi andesite intrusion, Sawtooth trail 89L-143 89L-143 89L-144 Tsi adacite intrusion, upper Goose Ck. 89L-144 Tsi andesite flow, ridge SE of Goose lake 89L-17 Tsa andesite flow, ridge SE of Goose lake 89L-18 89L-14 89L	89L-123	Tsd	
## andesite intrusion, Sawtooth trail ### andesite intrusion, upper Goose Ck. ### Tsi mafic dacite intrusion, upper Goose Ck. ### DX89-16		Tsm	andesite mudflow clast?, E. of SR peak
89L-135B 89L-143 Tsi dacite intrusion, upper Goose Ck. 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. DY89-16 DY89-17 Tsa andesite flow, ridge SE of Goose lake DY89-17 DY89-18 Tsh andesite flow, N. of Goose Ck DS89007 Tsh andesite flow, N. of Goose Lake DS89008 DS89008 Tsh andesite flow, head of Fisher Ck SE of Goose lake DS89009 Tsh andesite flow, SE of Goose lake DS89010 Tsa andesite flow, SE of Fisher Ck. 89L-136 SPL-137 Ttm dacite flow, S. of Goose Ck. near cont. divide 89L-137 Ttm dacite flow, Cont. Divide 89L-138 Tsi dacite intrusion, W. of Sawtooth Mt., Cont. Divide 89L-140 Ttm silicic dacite flow, W. of Sawtooth Mt., Cont. Divide 89L-141 SPL-148 Tsi andesite flow, NW of Table Mt. DY89-20 Ttm andesite flow, NW of Table Mt. DY89-24 Ttm andesite flow, NE of Sawtooth Mt. summit DY89-24 Ttm andesite flow, NE of Sawtooth Mt. DY89-25 Ttm andesite flow, Ne of Sawtooth Mt. DY89-26 Ttm andesite flow, Ne of Sawtooth Mt. DY89-26 Ttm andesite flow, Ne of Sawtooth Mt. DY89-26 Ttm andesite flow, Ne of Sawtooth Mt.			mafic dacite mudflow clast, E. of SR peak
89L-143 89L-144 Tsi mafic dacite intrusion, upper Goose Ck. DY89-16 DY89-17 Tsa andesite flow, ridge SE of Goose lake DY89-18 DY89-20 DY89-20 DY89-20 DY89-20 DY89-21 DY89-22 DY89-24 DY89-24 DY89-25 DY89-25 DY89-25 DY89-25 Ttm andesite flow, NE of Sawtooth Mt. DY89-25 Ttm andesite flow, NE of Sawtooth Mt. DY89-25 DY89-26 Ttm andesite flow, NE of Sawtooth Mt. DY89-26 Ttm andesite flow, NE of Sawtooth Mt. DY89-25 Ttm andesite flow, NE of Sawtooth Mt. DY89-26 Ttm andesite flow, NE of Sawtooth Mt. DY89-26 Ttm andesite flow, NE of Sawtooth Mt. DY89-25 Ttm andesite flow, NE of Sawtooth Mt. DY89-26 Ttm andesite flow, NE of Sawtooth Mt.			andesite intrusion, Sawtooth trail
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DY89-24B Ttm andesite flow, N. of Sawtooth Mt. DY89-25 Ttm andesite flow, near base of Sawtooth Mt. DY89-26 Ttm andesite flow, NE of Sawtooth Mt.			
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DY89-27 Ttm mafic dacite flow?. W. of Sawtooth Mt.			andesite flow, NE of Sawtooth Mt.
, 	DY89-27	Ttm	mafic dacite flow?, W. of Sawtooth Mt.

Table 5. Mineralogic data for volcanic rocks discussed in this report. Mineral abbreviations used are as follows: pl=plagioclase, hb=hornblende, bt=biotite, cpx=clinopyroxene, opx=orthopyroxene, px=pyroxene, sn=sanidine, and qtz=quartz.

Field No.	Formation Map Symbol	Mineralogy
88L-67	Th?	hb, cpx, pl, qtz-resorbed, opaques
88L-68	Th?	hb, pl, cpx, qtz-resorbed, opaques
88L-69	Th?	hb-altered, cpx & opx, quartz-embayed, opaques
89L-100 89L-118	Th? Th?	hb-altered, cpx & opx, qtz-embayed, opaques hb-altered, cpx & opx, qtz-embayed, opaques
TPR-3	Tpr	pl,bt,sn?,trace qtz
85L-39	Tf	pl, hb, bt, sn, opaques (no thin section)
SJ85-47 89L-101	Tf Tf	N.A. pl, hb, cpx & opx, opaques, sphene-trace
89L-102	Tf	pl, hb, bt, opaques
89L-107 89L-112	Tf Tf	pl, hb, bt, opaques pl, hb, bt, cpx & opx?, opaques
89L-120	ŤĚ	pl, hb, bt, cpx, opaques
DY89-6	Τf	pl, hb, bt, resorbed sn-trace, opaques
DY89-10 DY89-11A	Tf Tf	<pre>pl,hb-altered, bt?, opaques, (mafics are altered) pl, hb, bt, opaques</pre>
DY89-11B	Tf	pl, hb, bt, cpx, sn-resorbed, opaques, sphene-trace
DY89-12	Tf	pl, hb, bt, cpx, sn-resorbed-trace, sphene, opaques
DY89-14 DS89001	Tf Tf	pl, hb, bt, cpx & opx, opaques pl, hb, bt, opaques, sphene-trace
DS89003	Tf	pl, hb, bt, sn-trace-resorbed, opaques
DS89004	Tf Tfm	pl, bt, hb, qtz-resorbed, sn, opaques
DS89006 DS89012	Tf	pl, hb, bt, opaques pl, hb-altered, bt-altered, sn-resorbed, opaques
DS89014	Tf	pl, hb-altered, bt, cpx, sn-resorbed-trace, opaques
DS89015 DS89028	Tf Tsđ	pl, hb-altered, opaques pl, hb, opaques
DY89-7	Tsd	pl, hb, bt, cpx, opaques
DY89-8	Tsd	pl, hb-altered, cpx, bt-trace, opaques
DY89-9 DS89016	Tsd Tsd	pl, hb, bt, opaques pl, hb-altered, bt, opaques
DS89017	Tsa	pl, cpx & opx, hb, altered, opaques
D\$89019	Tsh	pl, hb-altered, cpx & opx, opaques
DS89029 DS89030	Tsh Tsh	pl, hb, bt, cpx, opaques pl, hb, bt, cpx & opx, (groundmass calcite alteration
DS89034	Tsđ	pl, hb, bt, opaques
DS89035	Tsd Tsi	pl, hb, bt, opaques pl,hb,px?, opaques CaCO3, alteration, mafics altered
88L-32 88L-34	Tsi	pl, px, hb, opaques
88L-36	Tsi	pl, hb, px, opaques, qtz-trace
88L-61 89L-129	Tsi Tsi	pl, hb, opx,cpx, opaques pl, cpx & opx-trace, hb-trace, opaques (trapped melt?
88L-31A	Tsa	pl, opx, cpx, hb-trace, opaques
88L-31B	Tsa	pl, hb, px, opaques
88L-31C 88L-58	Tsh Tsd	pl, hb, px, opaques pl,hb,px?,opaques,some feldspars are altered
88L-62A	Tsh	pl, hb, bt, px?, opaques (no thin section)
88L-62B 88L-62C	Tsh Tsd	pl, nb, blotite-trace, opaques
88L-62D	Tsd	pl, hb, opaques (no thin section) pl,hb,secondary quartz and calcite alteration
88L-62E	Tsd	pl,hb?,rock is slightly propylitized(no thin sect.)
88L-65 88L-66	Tsh Tsh	pl, hb, cpx, opx-trace, opaques pl, hb, bt, opaques
88L-70	Tsh	pl, cpx & opx, hb, opaques
89L-115 89L-115	Tsh	pl, hb, bt, px-trace?, opaques
89L-123	Tsh Tsd	pl, hb, bt-trace, cpx-trace, opaques pl, hb, cpx & opx, bt, opaques
89L-128	Tsm	pl, hb, cpx & opx, opaques
89L-130 89L-135A	Tsm Tsi	pl, hb, (opx & cpx)-trace amounts, opaques
89L-135B	Tsi	pl, bt, px, opaques pl, hb, opaques (mafics are altered)
89L-143	Tsi	pl-altered, hb-altered, opaques
89L-144 DY89-16	Tsi Tsh	pl-altered, hb-altered, bt, opaques
DY89-17	Tsa	pl, hb, cpx & opx, opaques pl, cpx & opx, hb, opaques
DY89-18	Tsh	pl, hb, bt, cpx & opx, opaques
DS89007 DS89008	Tsh Tsh	pl, hb-altered, bt?-altered, opaques
DS89009	Tsh	pl, hb, bt, opaques pl, hb, cpx, opaques
DS89010	Tsa	pl, cpx & opx, opaques
89L-136 89L-137	Ttm Ttm	pl, hb, opaques
89L-138	Tsi	pl, hb, opaques pl,hb, bt-trace, opaques
89L-140	Ttm	pl, hb, bt, opaques
89L-141 89L-147B	Ttm Tsi	pl, hb, bt, qtz, opaques pl,hb,bt trace, chlorite alteration
DY89-20	Ttm	pl, cpx & opx, opaques
DY89-21 DY89-22	Ttm Ttm	pl, cpx & opx, opaques
DY89-24	Ttm	pl, opx & cpx, opaques pl, hb, cpx & opx, opaques
DY89-24B	Ttm	pl, hb, cpx & opx, opaques
DY89-25 DY89-26	Ttm Ttm	pl, cpx & opx, hb, opaques pl, hb, cpx & opx, opaques
DY89-27	Ttm	pl, hb, opaques